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The Production and Exchange of Marine Shell Prestige Goods

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Marine shell ornaments have several characteristics that make them significant for archaeological analysis. Made from a raw material valued by cultures throughout the world and imbued with water, life, health, and fertility symbolism, shell objects have functioned as prestige goods. Shell prestige goods circulated between individuals, groups, and societies and materialized interpersonal relationships, making them valuable for archaeologists shifting focus from objects to the people in past societies. Shell ornaments had multiple roles, including ornamentation, wealth, marking status, and as ritual paraphernalia, and had varying symbolic associations even within a society. The rich ethnographic literature on shell use provides a source for archaeological model building. Marine shell artifacts often moved between societies and across long distances, offering a way for archaeologists to explore regional relationships and the interactions between ancient societies. To do this requires using several scales of analysis to investigate archaeological residues of a system that includes marine shell ornaments, the social organization of their production and exchange, and the people who made, displayed, and circulated them.

KEY WORDS: marine shell; prestige goods; craft production; exchange systems.

INTRODUCTION

Marine shell is no ordinary faunal material. In coastal regions, marine shellfish have been important as food (Claassen, 1998, pp. 175–195) or processed for dye (Reese, 1980; Ziderman, 1990). Their shells found much wider utility as raw material for tools, containers, trumpets, ornaments, inlay and gaming pieces, and figurines (e.g., Andrews, 1969; Di Peso, 1974; Holmes, 1883; Kenoyer, 1985;

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Luer *et al.*, 1986; Reese, 1985). Prized for the shapes, colors, and shininess of their natural forms, shells are symbolically linked with water and the sea, and their value increases with distance from the coast (Winters, 1968). The creation of beads from marine shell is as ancient as the Late Pleistocene (e.g., Bar-Yosef, 1991; Fiedel, 1989, pp. 189–190) and continues into the present day. With value added from the labor that transforms hard raw material into shaped ornaments, marine shells have served as prestige goods for adornment and display, money and wealth, status markers, and ritual use.

For archaeologists, marine shell is significant for several reasons. It was manufactured into objects that were used, circulated, and discarded in ways that left archaeological residues. Marine shell is a raw material with an extensive worldwide distribution, although its sources are limited to oceans and seas. It is sourceable (more or less) and identifiable as "exotic" when found inland, making marine shell a prime material for archaeological studies of exchange and interaction. Shell ornaments typically have been used in social exchanges that add prestige to the individuals who acquire, display, and circulate them. As prestige goods, shell ornaments materialize the social, political, and economic relationships between people at both local and regional scales (DeMarrais *et al.*, 1996). Discussions of the meanings and uses of marine shell ornaments abound in ethnographic and ethnohistoric descriptions of societies around the world and can be a rich source for archaeologists building models of prestige goods production, exchange, and use.

The research potential of shell has yet to be fully tapped by archaeologists. My purpose in this paper is to review the archaeological literature on the production and exchange of marine shell ornaments and highlight methods, problems, and potential avenues for more fruitful research. I have reached three main conclusions. First, marine shell ornaments were created and used as prestige goods to be worn, displayed, given as gifts, and exchanged. Perhaps marine shell possesses an inherent attractiveness that makes it an ideal material for displays of status, health, and success (Hayden, 1998, pp. 12–13). Passing through the hands of many people over long durations, shell prestige goods are material symbols of the interactions and relationships between individuals, groups, and societies in the past. They are objects that give archaeologists access to the people of the past. Second, shell ornaments and other prestige goods were used in multiple ways, even within one culture. The complexities of the functions and symbolism of marine shell and shell objects can be seen from some of the detailed ethnographic treatments of recent shell-circulating societies. This variability has sometimes been reduced by archaeologists to debates over whether shell beads were used as money or as status markers (Prentice, 1987). Close attention to depositional contexts, examination of shell imagery, and analyses that combine ethnographic, ethnohistoric, and archaeological data may reveal a better understanding of the uses and meanings of different kinds of shell ornaments in specific societies. Third, marine shell ornaments often moved between societies and circulated for long periods of time. To

understand how people used marine shell prestige goods, archaeologists must investigate locations of ornament production as well as consumption. It is important to research systems of marine shell ornament production and exchange at different scales of analysis to incorporate the distant regions and broad time spans that were linked by the creation, circulation, and deposition of marine shell artifacts.

Costin (2001) describes "production systems" in terms of key components—people, objects, and the techniques, mechanisms, and organization of production and exchange—and the interrelationships between them. She identifies six components of production systems. Discussion of the "artisans" includes the social identity of the craft producers in terms of their gender, age, status, ethnicity, as well as whether craft producers are specialists, how crafting is scheduled, and how crafters are recruited. The "means of production" component refers to raw materials and their procurement, and the techniques, production sequences, and production strategies that make up the technology. "Organization and social relationships of production" includes the spatial and physical aspects of production activities, the social organization of production units, and the context of production. "Objects" refers to the crafted items themselves, and their functions and meanings to their consumers. The "relationships of distribution" component includes not only spatial aspects of the movement of goods from one place to another but understanding the mechanisms for their circulation. "Consumers" includes discussion of the social identity of the users of crafted objects as well as the spatial patterning of consumption (Costin, 2001).

Breaking apart a production system into its component parts in this way allows us to conceptualize a complex topic and organize a large amount of information. But Costin's (2001) treatment also emphasizes the interplay between the components in such a system. Because these different components may be separated in time and space, it is important to conceptualize craft production and exchange as an interrelated system. In my review of the archaeological literature on shell working, I adopt Costin's production system as an organizational scheme, but I deviate from her sequence of components. Here, I start with the objects themselves and the role of marine shell ornaments as prestige goods. Because there are some key differences in the production and exchange of utilitarian and prestige goods, I begin with a discussion of marine shell ornaments as prestige goods and their role in prestige-goods economies. The subsequent section of this paper looks at research on the other components of marine shell ornament production and exchange systems.

MARINE SHELL ORNAMENTS AS PRESTIGE GOODS

The ethnographic and ethnohistoric literature abounds with descriptions of the display, exchange, and use of marine shell ornaments. In fact, marine shell is one of the best-documented materials used for prestige goods. I offer several ethnographic examples to show how shell ornaments have been valued as prestige goods.

Malinowski's anthropological classic, *Argonauts of the Western Pacific* (1922), is a study of *kula* exchange in the Trobriand Islands of Papua New Guinea. Here, we are provided with photographs of men and women making marine shell ornaments and with detailed descriptions of men exchanging shells with partners on different islands. Objects of marine shell are highly valued even in these island societies. The exchanges of red *Spondylus* or *Chama* shell bead necklaces for white *Conus* armshells take place over long distances between men from different islands of the Massim region (Weiner, 1988). *Kula* exchange is reciprocal, with the value of the shell given expected to closely match the value of the shell received, but is delayed, so that exchange sequences have long duration. *Kula* shell necklaces and armshells, made at several islands in the northeastern, northwestern, and southeastern Massim (Leach, 1983, p. 23), are ranked and valued by characteristics such as size, coloration, age, and history (Campbell, 1983).

Why do Massim men engage in *kula*? Leach (1983) summarizes three main explanations: *kula* exchanges preserve peace and facilitate trade in other resources between islands; *kula* exchanges allow men to compete for prestige; or *kula* exchange materializes social networks of people that maintain the social order. What is interesting from the detailed descriptions of *kula* exchange that have been published since Malinowski's *Argonauts* is the variability within the Massim region. Participation in *kula* exchange may be limited or more universal among men on different islands, the shell valuables may be used for internal exchanges within communities in some societies in addition to their role in the external *kula* exchange network, and the symbolism of the shells (for example, associations of armshells and necklaces with male or female) varies in different parts of the Massim (see papers in Leach and Leach, 1983). What is similar across the region, and common to all three explanations for *kula*, is that *kula* shell ornaments are highly valued even in these maritime societies and that their exchanges give material form to men's relationships with others beyond their local communities. "In the Trobriands, where exchange is the basic framework around which formal patterns of social interaction are organized, objects become highly significant because in their manner of presentation—quality, quantity, and the like—they can be read as an objectification of desire and intent" (Weiner, 1976, p. 212). Shell ornaments become material symbols of interpersonal relationships.

Many of the early ethnographers and travelers to Oceania described strings of shell disk beads and other ornaments as money (e.g., Lewis, 1929; for western North America see Gifford, 1926, pp. 377–378; Loeb, 1926, pp. 176–179). Traders in contact situations emphasized the money function of shell and other materials. Probably the best known "shell money" took the form of cowrie shells (*Cypraea moneta*) from the Indian Ocean, shipped to West Africa and used in the slave trade between the sixteenth and nineteenth centuries (Gregory, 1996; Hogendorn and Johnson, 1986). With more in-depth ethnography in areas of the world where shell was still actively exchanged, differences in the use of shell as valuables

became apparent. Connell (1977) documented twentieth century changes in shell use in the Solomon Islands in Melanesia, where certain kinds of shell were used in commodity exchanges and have now been replaced by Australian cash money; other shell products were used in social exchanges such as bridewealth (see also Ross, 1981; Strathern, 1975, pp. 101–111). Rawa speakers in Papua New Guinea distinguish specific kinds of shell ornaments based on the kind of shells or beads used, how they are sewn onto clothing, how they are worn and by whom (men or women), when they were traditionally worn, and what they can be exchanged for (if at all) (Dalton, 1996, p. 397).

Ethnographers and ethnohistorians have explored the complex uses, roles, and symbolism of shell objects in specific societies. Historically, shell bead wampum in northeastern North America had numerous functions: as ornaments, in belts as mnemonic records, and as an exchange object both for reciprocal gifts and non-reciprocal payments (Ceci, 1982, 1989; Smith, 1983). With European contact, the money function of shell bead wampum came to be emphasized to the exclusion of other uses in a system linking coastal Algonquians, European traders, and interior Iroquois (Ceci, 1982; Slotkin and Schmitt, 1949). For Indians in the Northeast, shell bead wampum, like gold and silver for Europeans, "served as tangible metaphors of highest cultural value: not simply wealth in the economic sense, but wealth as a visible symbol of 'well-being' " (Hamell, 1996, p. 51). Wealth symbolized health and success in a broader and more complex sense. It has become clear that shell ornaments (and metals) have multiple meanings and uses both within a society and as they move between cultures.

Prestige Versus Utilitarian Goods

Prestige goods are used "to display wealth, success, and power. The purpose is to solve a social problem or accomplish a social task such as attracting productive mates, labor, and allies or bonding members of social groups together via displays of success" (Hayden, 1998, p. 11). Alternatively termed "elite goods," "status goods," "primitive valuables," or "wealth," prestige goods are valued raw materials or manufactured objects used to establish and maintain social and political relationships. These objects are necessary items for marriage or mortuary payments and other social exchanges, may be used as symbols of social identity and high status, and can be accumulated as wealth (Dalton, 1977; D'Altroy and Earle, 1985; Dupré and Rey, 1973; Ekholm, 1977; Friedman and Rowlands, 1977; Meillassoux, 1978). Whether made of hard materials such as metal or shell or soft materials like cloth or fur, typically they are made from imported raw materials or materials with limited distributions, made with excessive labor input or with complex technologies (Ekholm, 1972; Haselgrove, 1982; Hayden, 1998; Peregrine, 1990). Peregrine (1990, pp. 149–158, 1991, pp. 3–4) identified ethnographic examples of prestige goods that functioned as valuables, as standardized

money, as status symbols, and as political or ritual symbols. Categories of prestige goods include both "badges of authority" that mark high status or rank, and "generalized wealth" that is more widely used and exchanged (Hirth, 1992, p. 22). The potential for elite control over acquisition, production, or exchange varies for these different kinds of prestige goods (Brumfiel and Earle, 1987).

Because marine shell is often a valued raw material and marine shell ornaments circulated as prestige goods, their production and exchange is likely to be organized quite differently from that of utilitarian goods. Hayden (1998) makes a distinction between practical technologies that respond to basic problems of survival and human maintenance, and prestige technologies that address social problems of attracting mates and allies. This distinction between practical and prestige goods in part involves different production priorities. Effectiveness and efficiency are primary considerations in practical technologies, while prestige technologies yield objects for display and social promotion that are labor intensive in their acquisition and production (Hayden, 1998, pp. 2–15). Specialized production of utilitarian goods often involves increased production efficiency and mass production, whereas for prestige goods, specialization may involve restricted knowledge of complex technologies or increases in production labor ("conspicuous production," Clark and Parry, 1990, p. 293; see also Peregrine, 1991). In addition, prestige goods are often made of exotic (nonlocal) materials, are curated rather than consumed, and are used in a variety of social, economic, and political exchanges.

Utilitarian and subsistence goods are often exchanged locally and may be traded between different regions, but prestige goods, or the materials used to make them, tend to be exchanged over longer distances and between networks of elites because of their high value (Hirth, 1992). Analysis of prestige-goods production and exchange, therefore, is important for understanding not only local or regional but also "macroregional" relationships (Blanton *et al.*, 1993; Feinman and Nicholas, 1993, pp. 103–104). While utilitarian goods are distributed, stored, and consumed, prestige goods often stay in circulation for extended periods. As they circulate, some prestige goods may acquire histories or names and become more valuable as heirlooms, so a long duration may pass before prestige goods are deposited in burials, caches, or hoards. Deposition or destruction of these objects was perhaps as a way of countering "inflation," converting wealth to status through "conspicuous consumption," or "promoting" oneself through a display of power (Dupré and Rey, 1973, p. 149; Halstead, 1993, p. 608; Hayden, 1998, pp. 13–14; King, 1976, p. 303). Why and when prestige goods would be buried is a question that needs further investigation, both through ethnography and archaeology.

Models of Prestige-Goods Economies

Because shell ornaments are made to be worn, displayed, gifted, and circulated between people, many researchers have discussed their role in prestige-goods

economies. Although this paper is not primarily about prestige-goods exchange, marine shell ornaments have been used in ways that contrast with the production, exchange, and consumption of utilitarian goods. Models of prestige-goods economies typically stress the control of these goods as a source of political power, but a focus on shell ornaments shows more variation.

Prestige-goods exchange involves the circulation of valued raw materials and crafted goods between individuals, elites, or kin groups to amass prestige, establish and maintain rank differences, and reinforce power hierarchies (Dupré and Rey, 1973; Ekholm, 1972, 1977; Frankenstein and Rowlands, 1978; Friedman and Rowlands, 1977; Meillassoux, 1978). As prestige goods are acquired, displayed, accumulated, and exchanged, they "materialize" social, political, and economic relationships between people (DeMarrais *et al.*, 1996), not just locally but at regional and interregional scales. Leaders derive status and validation through the accumulation of prestige goods that display their abilities to mobilize resources locally and regionally through their exchanges and interaction with other elites (Clark and Blake, 1994; Hirth, 1992). Helms (1993) explores how long-distance acquisition of goods demonstrates leaders' abilities and even cosmological power:

> Prestige is especially awarded when things acquired are obtained from outside and thereby contain an aura of exceptionality. Prestige is also accorded in such circumstances because acquisition of outside things reflects most favorably upon highly valued and lauded skills and personal characteristics of the acquirer, who has had to deal in some fashion with a conceptually distinctive foreign realm qualitatively defined as involving the sanctified, the mystical, or the power-filled. (Helms, 1993, p. 101)

Models of prestige-goods economies were originally developed by French structural-marxists interested in the ways that exchanges of food, prestige goods, and marriage mates transformed systems of seniority into hierarchies of ranked lineages (Dupré and Rey, 1973; Ekholm, 1972, 1977; Meillassoux, 1978). Control of the raw materials and production and distribution systems for prestige goods was seen as key to maintaining hierarchical systems (Ekholm, 1972, 1977). Exchanges of prestige goods or valuables were important in several of Friedman and Rowlands' (1977) evolutionary stages. However, they distinguish systems where rank is in flux and prestige gained through feasting and marriage exchanges, from systems where rank differences are set, tribute is passed up the hierarchy, and prestige goods and marriage mates are exchanged between elites of different polities. Their prestige-goods system is a further elaboration, where prestige goods are passed down the political hierarchy from elites at the center to lesser elites in outlying communities to maintain political and economic loyalties. It is at this point that control of prestige-goods production and long-distance exchange becomes important (Friedman and Rowlands, 1977, pp. 224–228).

Archaeological models of prestige-goods economies have emphasized the role of exchanges in status competition and the development of ranked or hierarchical systems, and attempts by emerging elites to control prestige goods production and exchange (e.g., Blanton *et al.*, 1993, pp. 219–224; Frankenstein

and Rowlands, 1978; Friedman and Rowlands, 1977; Haselgrove, 1982; Hayden, 1998; McGuire, 1985, 1989; Peregrine, 1990, 1991; Welch, 1991). Critiques of prestige-goods economy models cite an oversimplification of the relationship between social power and elite control of labor and exotics and a lack of attention to the diversity in prestige-goods economies (Cobb, 1993, pp. 63–64; Saitta, 1999). Although most definitions of prestige-goods economies focus on the issue of control of prestige-goods production and exchange, the archaeological evidence for such control is less forthcoming. Following Friedman and Rowlands (1977), I find it useful to differentiate stages in the development of prestige-goods economies, each with distinct archaeological expectations (Trubitt, 1996, pp. 36–39; see also Frankenstein and Rowlands, 1978). Early stages of prestige-goods economies vary from later stages in terms of rank negotiation and status differentiation and should present differences in terms of the centralization and control of prestige-goods production, and the circulation of prestige goods at a local or regional scale. Control of prestige-goods acquisition, production, and exchange as a source of political power is expected to be a feature of late stage or developed prestige-goods systems (Trubitt, 1996, 2000). Most discussions of prestige-goods economies assume this later stage, and I suggest that more attention be paid to the circulation of prestige goods in societies with dynamic rank and prestige competition.

The investigation of prestige-goods exchange from archaeological data has focused on the distribution of imported, centrally produced, and locally produced prestige goods deposited in burials of individuals of differing status and in hoards (e.g., Frankenstein and Rowlands, 1978; Haselgrove, 1982, pp. 81–84). McGuire (1985; McGuire and Howard, 1987) investigated the Hohokam as a prestige-goods economy by documenting changes in social inequality as seen from burials and residences, and in the production and exchange of shell valuables as seen from distribution data. A temporal shift from the acquisition of finished ornaments to their manufacture at Hohokam centers is identified (McGuire and Howard, 1987). Analysis of the depositional contexts of shell objects can aid in understanding the meanings and uses of shell prestige goods, while examination of craft production locales is needed to answer questions about the social organization of production and the control of prestige-goods production or distribution.

INVESTIGATING SHELL ORNAMENT PRODUCTION SYSTEMS

Ideally, archaeologists could follow marine shell prestige goods on a trajectory from raw material acquisition and ornament production by artisans, through the exchange, circulation, or distribution of finished goods to consumers, to their use, reuse, and final disposal or deposition. In reality, the archaeological literature on marine shell artifacts has concentrated on identifying the types of shell objects at coastal and inland sites, the potential sources of the raw materials, and distributions and deposition contexts of finished ornaments. Archaeologists are

increasing their recognition and investigation of production locales, providing a key link to the social organization of production. There has been little discussion of the mechanisms for the movement of shell and shell objects from artisans to users, or of the social identity of producers and consumers. Conversely, the ethnographic literature on the people who create, circulate, and use shell ornaments is rich, and archaeologists should take advantage of this information for models and analogies.

With an overview of the objects—marine shell prestige goods—as background, I now look at archaeological investigations of shell ornament production systems and discuss some methods, problems, and areas for future research. I begin with the materials, tools, and techniques of shell ornament production. I proceed to examine research on the organization of production, including the units and contexts of shell ornament production. Issues of the identity of producers and consumers of shell ornaments are addressed. Finally, I discuss research on the mechanisms of distribution and circulation of shell, and the uses and meanings of the objects themselves.

Raw Materials and Sources

A first step in investigating production and exchange systems is the identification of raw materials and their sources. For marine shell, this involves identification of shell species and their natural ranges. Identifying species can be difficult if the original shell has been altered by manufacture into ornaments, or if identifiable features on the shell have deteriorated before or after manufacture and deposition (Claassen, 1998, pp. 54–70, 89–90; Davis, 1989; Topping, 1989). Distinguishing recent from fossil shell can be problematic but necessary for identifying sources. Shackleton and Elderfield (1990) employed strontium isotope dating to differentiate older fossil *Spondylus* species found in central Europe from the recent *Spondylus* species with a Mediterranean range. Identification of shell artifacts to species is compounded by changes in biological classification by malacologists, variation in shell size and form with age and growth environment, and intergrades between species with overlapping ranges. For example, archaeologists working with whelk shell ornaments in eastern North American assemblages have had some difficulty in identifying the species of *Busycon* used and thus the source areas of the shells. While the thicker-shelled, spinier, and more robust *Busycon pulleyi* lives in the western Gulf of Mexico and the thinner, smoother *Busycon sinistrum* ranges in the eastern Gulf and southern Atlantic, these species intergrade in the Mississippi River delta region. Furthermore, the size, appearance, and robusticity of individual shells is affected by local growth environment (Dreiss, 1994; Luer *et al.*, 1986).

Assuming one can navigate the malacological difficulties and identify shell artifacts to species with some reliability, the problem then becomes one of pinpointing a source area. Collecting or quantifying modern shell distributions along coasts can establish ranges (e.g., Hale, 1976, pp. 66–69; Kenoyer, 1997, p. 274),

but marine shellfish often have large (ocean-sized) natural ranges. More precise sourcing may be possible if local growth environments of shellfish have detectable geochemical differences. Some research has shown the potential of both oxygen isotope analysis and chemical trace element analysis to source shells and shell artifacts to regions of origin (Claassen, 1989, 1998, pp. 212–216; Claassen and Sigmann, 1993; Kenoyer, 1997, pp. 274–275; Shackleton and Renfrew, 1970). These techniques are promising for archaeologists interested in more detailed reconstructions of the circulation of shells across regions.

Tools and Techniques of Ornament Manufacture

Marine shell recovered from archaeological sites tends to be soft and friable, but fresh shell is dense, compact, and hard. It is a raw material that is surprisingly difficult to work. As Holmes (1883, p. 286) pointed out: "Let any one who thinks lightly of such a work [cutting and engraving shell] undertake, without machinery or well-adapted appliances, to cut a groove or notch even, in a moderately compact specimen of *Busycon*, and he will probably increase his good opinion of the skill and patience of the ancient workman if he does nothing else." Shell artisans around the world have faced similar problems, leading to similar solutions in production tools and manufacturing techniques. This becomes clear when marine shell working is viewed cross-culturally, but often this perspective has been lacking. Unlike archaeological approaches to lithic or ceramic technologies, the shell literature has been rather provincial. (The 1986 Shell Bead Conference held at the Rochester Museum and Science Center and the 1995 "Shell Ornament Production: A New World Perspective" symposium at the Society for American Archaeology Annual Meeting are exceptions, but both concentrated mainly on evidence from the Americas.)

The forms of finished shell ornaments have received more attention than production techniques or locales. A wide variety of shell ornaments are found archaeologically (e.g., Bennyhoff and Hughes, 1987; Brown, 1996; Ceci, 1989; Fowler *et al.*, 1999; Hammett and Sizemore, 1989; King, 1978). Beads were made by perforating small, whole shells or by cutting, shaping, and perforating pieces of large shells (e.g., Biscione *et al.*, 1981; Francis, 1982, 1989; Miller, 1996; Moholy-Nagy, 1989; Reese, 1989). Shells were cut, chipped, ground, and smoothed to form bracelets, bangles, rings, pins, pendants, and gorgets (e.g., Bradley, 1993; Dales and Kenoyer, 1977; Feinman and Nicholas, 1993; Holmes, 1883; Kenoyer, 1985; McGuire and Howard, 1987; Tosi, 1984; Turner, 1993). Empirical documentation of the archaeological residues of shell ornament production is an important step in analyzing shell-working technologies.

The techniques and the tools for working shell can be gleaned from ethnographic and ethnohistoric descriptions, from experimental replication, and from finished and discarded shell ornaments, debitage, and associated tools. From

ethnographic and ethnohistorical sources come descriptions of tools for cutting and shaping shell, such as flint tools and sandstone grinding stones (e.g., Lewis, 1929; Loeb, 1926, pp. 177–178; Strathern, 1975, pp. 237–239). Malinowski (1922, pp. 367–374, Plate L-LII) describes and illustrates *Spondylus* shell bead making by Trobrianders. Connell (1977, p. 93) provides details on shell disc bead manufacture on the Solomon Islands where women make beads by breaking and shaping shell into discs, smoothing, and drilling holes in the centers, traditionally using stone tools and flint-tipped string drills, more recently using hammers, metal cylinders, and brace and bit drills. The final smoothing is done by men, who formerly used grooved stones and a sand-water abrasive, but more recently use imported grinding blocks. Production estimates for craftswomen and men and for households are provided (Connell, 1977, pp. 93–94). Ethnographies can provide information on the time required for ornament production and the gendered tasks associated with shell craftwork. This is important for archaeologists interested in the gender of craftworkers; this issue has rarely been addressed for shell.

Replication studies can generate hypotheses about manufacturing sequences, identify distinctive tools and by-products of the fabricating process, and provide time and labor estimates. Experimental replication of ornaments by male and female researchers might point out differences in production time or strength requirements. Replication often provides a personal perspective on shell working and use. Lewenstein (1987, pp. 66–67) describes replicating a shell trumpet and her slow progress sawing at the columella tip with lithic tools before hitting on the score-and-snap technique. After producing a loud blast on a *Turbinella* trumpet from Dzibilchaltun, Mexico, Andrews (1969, p. 56) reports "I was convinced that much of my lip membrane was permanently destroyed and my front teeth perilously shaken." In addition to shell trumpets, researchers have replicated bracelets or bangles (Dales and Kenoyer, 1977) and several types of shell beads (e.g., Francis, 1982, 1989; Kenoyer, 1985, p. 316; Miller, 1996; Morse, 1975, pp. 137–139, 141, 144; Sierzchula, 1980).

Replication and use of shell-working tools led to the identification of distinctive microwear and polish on microlithic chert drill bits used for drilling holes in shell beads (Allen *et al.*, 1997, pp. 25–26; Arnold, 1987a, p. 257; Lewenstein, 1987; Peterson, 1986; Pope, 1989; Yerkes, 1983, 1987, 1989a). Chert microdrills with the same basic form and usewear have now been identified as a specialized tool for working shell in numerous archaeological assemblages from both the New World (Arnold, 1987a,b; Feinman and Nicholas, 1993, p. 108, Fig. 10; Holley, 1995; King, 1976, pp. 309–314; Lewenstein, 1987, p. 66; Mason and Perino, 1961; Masucci, 1995, pp. 76–77; Morse, 1975, pp. 124–145; Pope, 1989; Yerkes, 1989b) and the Old World (Allen *et al.*, 1997; Kenoyer, 1985, p. 316, 1997, p. 271; Laporte, 1998; Miller, 1996, pp. 12–13). Other tools, such as sandstone saws, slabs, and grooved abraders (Masucci, 1995, p. 76; Morse and Morse, 1983, pp. 250–251; Pauketat, 1993, pp. 92–96; Seymour, 1988, pp. 821–822), or metal hammers, picks, chisels, and saws (Kenoyer, 1985, pp. 310–316), are usually

identified as part of the shell-working "kit" based on their association with shell debris. From the Archaic Indian Knoll site in Kentucky, a tool kit interpreted from a burial context contained pieces of shell, finished shell beads, shell bead blanks, a "bone drift," and a "flint reamer," but was associated with an infant or juvenile (Webb, 1974, p. 170, 192; see also Winters, 1968, p. 209).

Unfinished ornaments and pieces of shell often retain signs of the techniques used for cutting, shaping, and perforating (e.g., Di Peso, 1974, Fig. 262-2; Durante, 1979; Feinman and Nicholas, 1993, Fig. 7; Kenoyer, 1985, p. 310; Laporte, 1998, p. 18, Fig. 2–3; Mester, 1989, Fig. 6; Turner, 1993, pp. 95–102). A score-and-snap technique was often used to break shell into pieces, and abrading or grinding shell on sandstone slabs to shape and polish ornaments was a common final step. Some pieces of shell from the Cahokia site in the Mississippi River Valley had saw marks from scoring with a sandstone saw (Pauketat, 1993, pp. 99–102). Worked shell pieces from the Ejutla site in Oaxaca, Mexico, indicate that cane tube drills and string were used for cutting shell (Feinman and Nicholas, 1993, 2000, pp. 128–129). Crafting of *Glycymeris* bracelets in the American Southwest involved cutting and chipping of the bivalve shells and extensive grinding and smoothing, with unfinished pieces showing chipped edges (Bayman, 1996, pp. 409–411).

In a recent discussion of Chumash shell working, Arnold and Graesch (2001) detail the manufacturing sequences used in the California Channel Islands to produce beads from *Olivella*, *Haliotis*, *Tivela*, and *Mytilus* shell, ornaments from a variety of shell genera, and fishhooks from *Mytilus* and *Haliotis* shell. The form of the manufacturing waste and by-products differs with the various raw materials and finished products. Clear identification of these specific by-products, such as bead blanks and beads-in-production, is necessary to interpret the spatial and social organization of bead production (see also Laporte, 1998; Miller, 1996, pp. 17–20). Expositions of manufacturing sequences and technologies, considered essential to analyses of stone tool production, have been relatively rare in the shell-working literature.

Social Contexts of Marine Shell Ornament Production

Production areas or workshops can be identified from shell-working residues. Archaeological indicators of shell ornament production may include unworked shells, waste pieces and small debris, broken or unfinished ornaments, and manufacturing tools (Dales and Kenoyer, 1977, pp. 14, 18; Kenoyer, 1985, pp. 325–329; Tosi, 1984, p. 38; Trubitt, 1996, pp. 223–242). Spatial separation of different stages of production may complicate identification of workshops. For example, both shell beads and the stone drills for perforating them were made at the Late Neolithic Ponthezières site in western France (Laporte, 1998, pp. 17–19), but often at separate sites in the California Channel Islands (Arnold, 1987a, pp. 216–222, 1987b, pp. 222–229).

One problem has been differentiating production areas from use, storage, or discard locations. Quantities of broken *Spondylus* rings found in domestic areas at the Late Neolithic site of Dimini in Greece were interpreted as differential accumulation and destruction/consumption by certain households rather than evidence for specialized craft production (Halstead, 1993). One useful analytical technique to differentiate production areas from consumption activities has been to compare ratios or proportions of manufacturing debris and broken or in-process pieces to finished shell ornaments (Arnold and Graesch, 2001; Bayman, 1996; Feinman and Nicholas, 2000; Howard, 1985, p. 461). Identifying production locations as opposed to storage areas may be difficult. At Casas Grandes in northern Mexico, nearly 4 million worked and unworked shells along with some shell-working tools were found in two roomblocks and interpreted as manufacturing and storage for trade (Bradley, 1993, pp. 128, 134–137; Di Peso, 1974, pp. 383–386, 394–396, 501–505, 627–629). Because the majority of the shell ornaments were perforated *Nassarius* whole-shell beads, minimal manufacturing debris would have been produced (Bradley, 1993, pp. 135–136). Differentiating between actual workshop locations and dumps of workshop debris also is a problem (Miller, 1996, p. 23). Turner (1993) used the presence of microdebitage from test excavation flotation samples, in addition to shell and stone debris and broken ornaments, to identify shell and fine stone lapidary workshops at Teotihuacan, Mexico. Small debris would be left in situ on workshop floors even after clean up, and this microdebitage may be the best indicator of workshops as opposed to storage or dump areas (Turner, 1993, pp. 94–95; see also Feinman and Nicholas, 2000, p. 130; Mills, 2000, pp. 314–315; Seymour, 1988, pp. 816, 820–821).

The location of shell ornament production is archaeologically detectable and is the key to understanding the social organization of production, that is, the size and composition, affiliation, and distribution of production groups (see Costin's (1991) parameters of production: scale or constitution of production units and intensity, context, and concentration of production activities). Shell working has most often been identified archaeologically in residential contexts, indicating household production (either for internal use or for exchange), especially in the Americas. This may be because the labor required for shell ornament production is time consuming rather than requiring specific facilities or large work groups. In the American Southwest, shell-working activity areas including shell debris and broken ornaments were identified on house floors at Los Hornos (Howard, 1985, p. 463; McGuire and Howard, 1987, p. 123) and Snaketown in Arizona (Seymour, 1988, pp. 813, 816–820; Seymour and Schiffer, 1987, pp. 585, 587). Shell ornament production is one of the household activities highlighted in Flannery's *The Early Mesoamerican Village* (Flannery and Winter, 1976, pp. 39, 41–42; Pires-Ferreira, 1976, pp. 315–316). More examples are emerging as "household archaeology" is employed to investigate status and activity differentiation within communities.

Although it is unusual to find descriptions of larger nonresidential production units, shell-working debris has been identified both in residential apartment areas and in nonresidential shell workshops at the urban centers of Teotihuacan, Mexico, and Moenjo-daro, Pakistan (Kenoyer, 1985, pp. 326–327; Turner, 1993, pp. 92–95, 106–108; Wright, 1996, p. 127).

We are beginning to get a sense of the variability in the scale and intensity of marine shell ornament production, in the status of craftworkers and consumers, and in the control of labor, materials, or exchange systems in societies across a range of sizes, political organizations, and geographic locations. Household production of shell ornaments ranges from low-intensity production for domestic use evidenced by shell bead manufacturing tools and debris found at small farmstead sites in the El Azúcar River valley in Ecuador (Masucci, 1995, pp. 72–73), to intensive production for exchange at the Ejutla site, Oaxaca, Mexico, where Feinman and Nicholas (2000) describe large quantities of worked shell fragments, production failures, and worn chert microdrills associated with a residential structure and midden. The quantity of marine shell debris and the small proportion of the assemblage represented by finished ornaments indicates production for exchange—specialization—even though the production unit was the household. This household was involved in lapidary and ceramic production as well as shell ornament manufacture (Feinman and Nicholas, 2000).

The identification of shell ornament specialization is often hotly debated because of the linkage between craft specialization and societal complexity (for the Mississippian Southeast, see Blitz, 1993; Brown *et al.*, 1990; Muller, 1986, 1987, 1997; Pauketat, 1997; Prentice, 1983; Yerkes, 1983, 1986, 1989a,b, 1991). Specialization in shell ornament production has been interpreted by archaeologists using several lines of evidence. Some researchers focus on the quantity of shell-working tools and debris, coupled with the relative lack elsewhere (e.g., Feinman and Nicholas, 2000; Laporte, 1998; Moholy-Nagy, 1995). At Balakot, Pakistan, specialized production of shell bangles was interpreted from the concentration of shell-working debris (unworked shell, grinding tools, grinding and chipping waste, bangle fragments in various stages of manufacture) and finished bangles in a few areas of the site (Dales and Kenoyer, 1977, pp. 14, 18). Other methods involve estimating production output to assess the intensity of production (Yerkes, 1991), or examining standardization in tools and in final products or production success rates (Allen *et al.*, 1997; Holley, 1995, pp. 50–53; Miller, 1996, pp. 24–27). In the California Channel Islands, the production of both shell beads and the chert microdrills for perforating them has been interpreted as specialized based on the very high densities of production debris that far exceeded what was found on mainland sites and from high levels of standardization and success rates for microdrill production (Arnold, 1987a,b; Arnold and Graesch, 2001). From Late Period deposits on bead-making sites on Santa Cruz Island, Arnold (1992, p. 135) reports average mean densities of 60,000 pieces of *Olivella* detritus, 1400 bead

blanks and beads-in-production, and 1800 microliths per cubic meter. This was very intensive production of shell beads indeed.

Shell Ornament Producers and Consumers

The identity of both craftworkers and consumers of marine shell ornaments is a topic that needs more attention and research. The social identity of artisans includes consideration of gender, age, status, kin relations, and ethnicity. The identity of consumers can be addressed on similar lines. Related concerns are whether producers were specialists, the intensity or amount of time spent crafting, and how artisans were recruited (Costin, 1998, 2001).

Some research has focused on the status of shell ornament crafters and consumers, and interpretations of the relationships between them. At the Maya site of Tikal, shell specialists worked in household contexts to produce ornaments for both elites and commoners (Moholy-Nagy, 1995, pp. 8–9). Here, Moholy-Nagy (1995, p. 11) suggests that the same artisans may have made both "low-status" and "high-status" shell ornaments. In the Mississippian Southeast, there is evidence for shell working associated with elite residences (Schnell *et al.*, 1981, pp. 60–61, 227, 231). I examined the relationship between household status and evidence for shell working at Cahokia and outlying communities in the Mississippi River valley and found a stronger association of status and shell working later in the Mississippian sequence (Trubitt, 1996, pp. 246–255, 2000, p. 675). Two excavated household units from Cahokia point to an association of more intensive shell working with higher-status households (Kelly, 1995; Pauketat, 1993) that might represent "embedded" specialists who work within elite households or who are themselves elite (Ames, 1995, p. 158; Trubitt, 1997, 2000, pp. 675–676).

Discussion of the identity of producers and consumers intersects with the issue of control of the production process and the identification of independent, attached, or embedded specialists (Ames, 1995; Brumfiel and Earle, 1987; Clark, 1995; Costin, 1991). Spatial patterning of production residues has been used to interpret control of shell ornament production by elites. For example, Wright (1996, p. 127) mentions shell inlay as an example of Harappan-administered production based on production debris in a palace at Mohenjo-daro. Arnold and Munns (1994) investigate whether California Channel Islands shell bead producers were independent or attached specialists. On the basis of data from a number of village sites in the Channel Islands, they conclude that specialists made shell beads and chert microdrills without direct control by elites. Instead, elites indirectly controlled the distribution of finished beads to mainland sites through their roles as canoe owners. The production of valuables by craft specialists in a hunter–gatherer society is unanticipated by many models of complexity, as is a lack of centralized control of production by elites (Arnold and Munns, 1994, p. 475).

The Circulation of Marine Shell Artifacts

Archaeological interpretations of the circulation of marine shell and ornaments come from spatial analyses of distributions at both local and regional levels. Quantification of shell and analysis of spatial distributions at the intrasite and intersite scales have the potential to address issues such as the centralized control of, coordination of, or restricted access to valued nonlocal materials. Using data from the Tucson Basin in the American Southwest, Bayman (1992) examined the distribution of shell and other exotics in household middens in the Hohokam community of Marana. At the intrasite scale, he found no clear differences in access to exotics among households within the platform-mound village, but higher frequencies of exotics were found in mound-village household middens as compared with household middens at surrounding nonmound sites, suggesting people at the platform-mound village had a larger role in the exchange system. Further work revealed that both production and consumption of shell ornaments took place at the platform-mound village, and additional ornaments were probably brought in from beyond the community (Bayman, 1996).

Archaeologically, the final deposition of marine shell ornaments is often far from the production locale. Thus understanding shell prestige-goods production and exchange systems also requires the perspective from consumer sites. Most often, studies have resulted in distributions of shell artifacts at inland sites by shell species, with inferences on trade networks or trade routes and their change over time (e.g., Biscione *et al.*, 1981; Bradley, 1993; Erickson, 1990, pp. 115–133; Howard, 1985; McGuire and Howard, 1987; Paulsen, 1974; Pires-Ferreira, 1976; Reese, 1986, 1991a,b; Sempowski, 1989; Winters, 1968). For example, Bennyhoff and Hughes (1987; Hughes, 1994) analyzed thousands of *Olivella* shell beads from sites in the Great Basin region of the American West, looking at shell species, bead type, depositional context, and dating to reconstruct likely trade networks from four Pacific Coast shell sources and temporal trends in shell exchange.

Marine shell artifacts can be traced far inland from coastal sources. In North America, shell from Gulf of Mexico and Atlantic coast sources has been found in the northeastern, southeastern, and midwestern United States (e.g., Brown, 1983; Brown *et al.*, 1990; Ceci, 1989; Hale, 1976; Holmes, 1883; Kelly, 1991; Ottesen, 1979; Smith and Smith, 1989). A few sites in the northern Plains have artifacts from marine shell sourced to the Atlantic, Gulf of Mexico, and Pacific coasts, up to 2000 km distant (e.g., Carlson, 1997). Marine shell also traveled great distances in the Old World, where Indo-Pacific shell species have been found at sites in the Mediterranean region and Near East and into northern Europe (e.g., Durante, 1979; Michaelides, 1995; Reese, 1991b). Reese (1991b) details the distribution of shells that probably originated from the Red Sea, Persian Gulf, Arabian Sea, or the Indian Ocean to sites in Europe, the Mediterranean, and the Near East, identifying broad temporal and spatial patterns, and tentatively discussing mechanisms for the shell exchange and the use or meanings of the shell based on their deposition in

graves or at sanctuary sites. These distributional summaries are a needed component of research on shell exchange systems but can go further in addressing the mechanisms of this exchange.

Marine shell moved from coastal sources to inland sites through several mechanisms. Groups may have obtained shell directly, either through trips to the source by task groups or by incorporating such trips into the seasonal movements, or indirectly acquired shell through intermediaries, as gift exchange, or as centrally organized trade. Hughes (1994) discusses some of the pitfalls in assuming shell far from the coast was traded, in assuming shell exchange increased through time, and in using ethnographic descriptions to model trade before the disruptions of the contact era. Frequently, prestige-goods exchange has been suggested as a mechanism for the movement of shell artifacts (e.g., Bradley, 1993; Brown *et al.*, 1990; McGuire, 1985, 1989; McGuire and Howard, 1987; Pearson, 1990; Peregrine, 1990; Shackleton and Renfrew, 1970; Trubitt, 1996; Welch, 1991). Market exchange has been suggested for distribution of shell ornaments to Tikal commoners (Moholy-Nagy, 1995, p. 11) and for Chumash exchange in California (King, 1976). The movement of shell ornaments via specialized long-distance traders or *pochteca* has been postulated for Casas Grandes, Mexico (Di Peso, 1974, pp. 620–622, 627–629), and for the Spiro trade network between the southern Plains and the Mississippi Valley (Schambach, 1993, 1999).

As with other materials, exchange mechanisms may be hypothesized from spatial patterning of distributions of goods from known source areas (Dixon *et al.*, 1972; Renfrew, 1975, pp. 41–51; Renfrew and Bahn, 1996, pp. 351–356). With a few exceptions, interpretations of shell exchange mechanisms have not been based on regional spatial analysis of ornament distributions. Reese (1990, p. 416, 1991b, p. 188) suggests that a pattern of decreasing shell with distance from coastal sources and increasing spatial distribution through time could be interpreted as down-the-line exchange from Mediterranean and Red Sea sources. Although he has compiled a large volume of data on shell artifact distributions, he does not pursue a more formal spatial distribution analysis or compute fall-off curves. Bradley (2000) examines the spatial distribution of shell ornaments in the American Southwest with a model of prestige-goods exchange. "Specifically, the primary expectation is that the distribution of artifacts within a prestige economy should be clustered in larger centers rather than distributed randomly across the landscape. The items would not decrease with distance from the source in a typical distance–decay pattern but would cluster in association with sites housing elites and elders involved in prestige alliances," (Bradley, 2000, p. 180). In her interpretation of shell distributions, the Casas Grandes network is consistent with expectations for a prestige-goods economy while the Hohokam network is not (Bradley, 2000, pp. 181–182).

For the Mississippian Southeast, several researchers have quantified and mapped distributions of shell artifacts (e.g., Brain and Phillips, 1996; Brown *et al.*, 1990; Ottesen, 1979). Milner (1998, p. 164) raises the issue of deterioration of raw material quality with increased distance from source areas, citing some beads

made from marred, wormy shells found at Cahokia. Muller (1989, pp. 22–23, 25, 1997, pp. 375–379) calculated fall-off curves based on distributions of engraved shell gorgets of various styles. As a result, he argues against any centralized control of gorget exchange during the Mississippian period, suggesting instead some form of down-the-line exchange from a "center of distribution" for a particular style. Here we have a good example of how fall-off curves can be used to interpret shell exchange mechanisms, but a problem arises when the "center of distribution" or concentration of artifacts of a decorative style is interpreted as the "source" or production center (see also Brain and Phillips, 1996, p. 116). There is little direct evidence for the specific production locations or how far or long the finished products circulated before their final deposition. Although some prestige goods may have been exchanged locally, these engraved gorgets may have circulated for several generations and moved between different regions. Interestingly, Brown and Kelly (2000; Brown, 1989, pp. 193–204) use stylistic connections between engraved pottery and engraved shell to argue for a Cahokia production center for one of these decorative styles, even though little engraved shell has been recovered from this site.

As prestige goods and objects of exchange, shell ornaments may have been deposited far from their place of origin or manufacture. McVicker and Palka (2001) describe a Maya shell plaque, probably made in the Late Classic period and recarved in the Early Postclassic, that was recovered from Tula in central Mexico. The marine shell plaque is compared with similar figural plaques carved in jade. Stylistically linked to the lowland Maya Petén region, these plaques are found at sites in the Maya highlands and northern lowlands, Gulf Coast, and the central and southern Mexican highland regions. The shell plaque is interpreted as an object gifted from high-status Maya to visitors or foreigners as a symbol of alliance that was heirloomed, recarved, and circulated between other elites for a period of time before being deposited or cached at Tula as part of another ritual (McVicker and Palka, 2001, pp. 190–194). Placing in caches, burying with dead individuals, or destruction prior to disposal may indicate symbolically distinct rituals for the deposition of prestige goods. Finding shell objects far from their location of manufacture after a long period of circulation suggests that a larger scale of analysis at the regional level is needed.

Marine Shell Use and Consumption

The "consumption" of shell ornaments by ancient societies is perhaps even more difficult to reveal than their exchange patterns. Here again, the wealth of the ethnographic and ethnohistoric literature on shell use and meanings can inform archaeologists attempting to understand the past. This literature shows that marine shell often has symbolic associations and that the many uses of shell ornaments reflect multiple meanings of these objects. Smith (1983, pp. 227–228) lists some 40 recorded uses of shell wampum in the American Northeast, with shell

beads worn as ornaments, included in burials as grave goods, used to make compensation payments and fees for services, given as gifts, and used as mnemonic devices for messages (see also Ceci, 1982; Slotkin and Schmitt, 1949; for the Northwest/Plateau, see Erickson, 1990). Shell ornaments were used "in a social context comprised of diverse relations based upon gender, kinship, economics, politics, power, and status. In this complex web of relations, material culture (like shell beads) does not always have the same meaning, and often has multiple simultaneous meanings. Credible interpretations of the past from material remains must address this complexity" (Thomas, 1996, p. 29).

Shell beads, pendants, and gorgets have been used as adornment and body ornamentation. Like beads of other materials (see papers in Sciama and Eicher, 1998), marine shell beads can serve to construct or display social identity. Representations of humans or supernatural beings in ancient art may depict figures wearing shell ornaments. For example, shell beads and pendants of the types found archaeologically (e.g., Brown, 1996) are shown as necklaces and hair ornaments on Mississippian engraved shell from southeastern North America (Kneberg, 1959; Phillips and Brown, 1978, 1984).

Many of the marine shell ornaments recovered from archaeological contexts were deposited as grave goods (e.g., Dreiss, 1994; Gallay and Mathieu, 1988; King, 1978; McGuire and Howard, 1987; Pearson, 1990; Reese, 1991a; Sempowski, 1989; Winters, 1968). The presence of shell ornaments is often seen as a status indicator. For example, *Spondylus* and *Conus* shells were often included with high-status individuals in Moche burials in Peru, and shells also were incorporated into Moche iconography in depictions of mortuary ritual (Hill, 1998). Possible gender associations of shell ornaments are discussed by Thomas (1996; see also Winters, 1968, pp. 197–198, 208–209). Although Thomas (1996) finds similar uses of shell for men and women in a sample of Mississippian burials from North Carolina, Eastman (2001) identifies certain shell ornaments as female-related grave goods and other types mainly associated with young individuals in another study from fifteenth to sixteenth century sites in Virginia and North Carolina. The common placement of shell beads in graves of children has been argued as evidence of ascribed status or, conversely, parental gifts and mourning practices (Claassen, 1998, p. 206; Dreiss, 1994; Fiedel, 1989).

Why is shell so often found in burials? Perhaps it is because of its restorative or healing properties (Pietak, 1998, pp. 141–146). Pietak (1998) considers the mortuary use of shell beads, and their later replacement with glass beads, by seventeenth to eighteenth century Delaware and Munsee in eastern North America. Shell beads in burials were primarily used for necklaces, decorating the head and upper body, and were often interred with children. "That children were often interred with ornaments of shell . . . may symbolize the recognition that they were not permitted to attain full social status, represented by adulthood, and that these material goods were placed on their bodies to instantaneously give them access to the socially approved qualities of full adulthood, knowledge and understanding,

and also to mitigate their pre-interment liminal state—a symbolic comment on the hope for restoration to life," (Pietak, 1998, p. 153). The restorative symbolism of shell was later transferred to glass beads, especially white glass beads, and mortuary use of beads expanded to include decorating clothing, bags, and hair in addition to encircling the neck and head; their use in burials extended to more members of the community.

Shells come from the oceans and are associated with water, creation, fertility, and rebirth, but also with death and the underworld (Claassen, 1998, pp. 203–209; Dreiss, 1994). White shell is symbolic of peace, fertility, ritual purity, well-being, or protection against disease or restoration to health (Claassen, 1998, pp. 205–206; Hamell, 1996, p. 51; Kenoyer, 1997, p. 275; Pietak, 1998; Thomas, 1996, pp. 39–40). There is color symbolism associated with shell: white and purple wampum linked with female and male or symbolizing social and asocial states in the American Northeast (Ceci, 1982, p. 99; Hamell, 1996, pp. 47–48); white *Strombus* shell contrasting with red *Spondylus* shell in Mesoamerica and South America (Mester, 1989; Moholy-Nagy, 1989, 1995); the highly valued Tyrian or Royal purple dye manufactured from *Murex* or *Thais* shells associated with wealth and royalty in the Mediterranean (Reese, 1980, 1987; Ziderman, 1990). In the Andes, nacreous pearl oyster shell (*Pinctada* or *Pteria*) was associated with lightness, shininess, and royalty (Mester, 1989). Saunders (1999) argues that the shininess of shell and pearls was linked with spirituality, life, and the supernatural; these materials were valued by Native Americans because of this association. Contact-period Europeans were interested primarily in the commercial value of pearls but also were drawn to their exoticness and associations with wealth, status, and royalty. Saunders' (1999) discussion of pearl and shell use on both sides of the Atlantic Ocean offers insights into the interactions between Europeans and Native Americans in the contact period and their cultural valuations of pearls and shells. His study is based on ethnographic and ethnohistoric rather than archaeological information, but approaching these interactions from the perspectives of both participating cultures is a fertile research direction.

Shell "moves between and transcends cultural boundaries" (Pearce, 1993, p. 3), as exemplified by Indo-Pacific cowries used by Europeans, Africans, and Native Americans and deposited at historic-period North American sites. This movement between cultures seems to be an important part of shell symbolism. Thorny oyster shell (*Spondylus* sp.), harvested from warm ocean waters off Ecuador, has been traded to Peru for use by Andean peoples for the last several thousand years (Paulsen, 1974; Sandweiss, 1999). In an interesting use of the past, a Peruvian governmental institution recently proposed that *Spondylus* shell be adopted as a symbol of the new peaceful relationship between the nations of Ecuador and Peru (Sandweiss, 1999).

Coastal peoples may assume access to marine resources, but for inland groups, like residents of the eastern North American Carolina Piedmont during the

sixteenth to seventeenth centuries, marine shell pendants, gorgets, and beads may have signaled their access to distant, rare, coastal resources (Hammett and Sizemore, 1989, p. 133). Helms (1993, pp. 101–104) explores how shell acquisition from distant, foreign, exotic sources brings prestige to the acquirer. By extension, shell objects become symbols of that prestige and power.

AVENUES FOR FUTURE RESEARCH

Archaeologists can certainly do more than describe and quantify shell artifacts. I share the optimism of DeMarrais *et al.* (1996, p. 16): "Because symbols are material objects, their distributions and associations, preserved in the archaeological record, reflect broader patterns of social, political, and economic activity. These patterns inform archaeologists about unequal access to symbols of status or authority, the efforts of one social segment to promote its ideology over others, and the effects of these strategic activities on the dynamics of social power." There are three areas that I would like to see targeted with additional archaeological research on marine shell. The first is the organization of shell prestige-goods production and exchange; the second is the use of marine shell in past societies; and the third is the identity of the producers and consumers of these shell objects.

Marine shell moved from coasts inland, sometimes as raw material, sometimes as finished objects. In order to fully understand the circulation of marine shell artifacts and the interaction systems of which they were a part, we need to look at production contexts to make interpretations about the organization of production and at spatial distributions of finished artifacts to interpret exchange mechanisms. One of the recent developments in shell research is the realization that there are broad cross-cultural similarities in shell ornament production tools and techniques. The identification of similar microdrills used for shell bead drilling in widely separated cultures is only one example. The residues of shell ornament manufacturing sequences, such as unworked raw material, waste pieces and small debris, broken or unfinished ornaments, and manufacturing tools, can be used to identify production locations archaeologically. Interpreting the organization or social relations of shell ornament production is decidedly more difficult, but this is where I find that some of the most exciting research is being done. A growing comparative data set indicates that shell ornament production most often took place in household contexts, at least in the Americas. More comparative information is needed from sites in Europe, Africa, and Asia. We see a range in the intensity of household production, from the low-intensity production described by Masucci (1995) for the El Azúcar River valley of Ecuador, to the high-intensity production for exchange evident in the California Channel Islands (Arnold and Graesch, 2001).

More attention to the "consumption" end of the sequence is still needed. Distributions of nonlocal materials like marine shell can be used to identify interactions

between societies. Changes in styles or types can signal the presence of social boundaries. There is much data in the literature on distributions of finished artifacts, but more attention to the archaeological correlates of various mechanisms for shell circulation is needed. Muller's (1997, pp. 370–379) analysis of Mississippian engraved shell gorgets shows the potential for this type of analysis, but substitutes hypothetical distribution centers as sources. Without knowledge of the locations of gorget production, Muller's fall-off curves show the movement of ornaments from distribution centers that may or may not be production centers.

We need more studies that look at both production and consumption sites for a fuller picture of the interactions using marine shell. For example, Bayman (1996) tracks both the production and consumption of shell ornaments in a Hohokam community in the American Southwest. By analyzing production evidence associated with households at the platform-mound site and the location of finished shell ornaments as an indication of consumption by residents of the platform-mound site and outlying settlements, mechanisms for the movement of shell ornaments into and within the community can be addressed (Bayman, 1996). A second example with longer distances comes from the Yoyoi period in Japan. Here, Pearson (1990) addresses both the evidence for production of ornaments from tropical shell species at sites in Okinawa and evidence for their ultimate deposition with elite burials at sites in Kyushu, about 500 km to the north. Pearson (1990, pp. 920–921) postulates that the shell ornaments were part of a prestige-goods economy in Kyushu, but underscores the need for more investigation to fully understand the mechanisms of this exchange, the intermediaries in the exchange system, and the transfer of shell ornaments from the exchange system to grave goods. Clearly, investigations of exchange and interaction between people in different regions requires both small- and large-scale research.

A second area with research potential is the use and symbolism of marine shell. Shell is often used like metals—for ornaments, money, and wealth when rare but for tools when commonplace—although there are differences in the technologies and in the symbolism of the two materials (there may be some overlap in symbolic associations, as seen in changes from shell to silver ornaments, e.g., Gregory, 2002). The rich ethnographic and ethnohistoric literature can be used to model the ways that shell prestige goods have been used by individuals and societies, and why goods are taken out of circulation and deposited into graves, caches, or structures. One fruitful research direction uses ethnographic or ethnohistoric data in conjunction with archaeological data from the same area to reconstruct meanings of shell and changes from shell to glass beads in specific societies. Pietak's (1998) analysis of changing ornament use among Delaware and Munsee Indians during the seventeenth and eighteenth centuries A.D. is an example of the potential of combining ethnographic, ethnohistoric, and archaeological data. Oceania, Mesoamerica, and South America may be other areas with good potential for this type of analysis.

The analysis of iconography on decorated shell and the use of shell imagery in other media may be avenues to understanding the symbolism and social functions of marine shell in human societies. Marine shell ornaments are sometimes decorated by carving, etching, or engraving designs. Marine motifs are not prominent on engraved *Tridacna* shells from the Near East or engraved gorgets from North America (e.g., Brain and Phillips, 1996; Kneberg, 1959; Reese, 1988; Reese and Sease, 1993). Examples of shell motifs are seen in other media in Mesoamerica and South America, where shells are associated with some Maya gods (Andrews, 1969, pp. 48–49) and pictured in Moche mortuary ritual iconography (Hill, 1998). Combining native texts and iconography and the archaeological evidence for shell use could be avenues for further research on the symbolism of marine shell in the Maya area or in the ancient Near East.

Finally, it is clear that more research attention is needed to explore the social identities of crafters and consumers of marine shell ornaments. The artisans who crafted artifacts and the consumers who used the objects are key components of production systems (Costin, 2001). Although there has been a focus on the household as the location and unit of shell ornament production, and some discussion of the status of shell-working households (e.g., Moholy-Nagy, 1995; Trubitt, 1996, 2000), there has been little effort on analyzing divisions of labor and task differentiation within households. In addition to status or rank, other dimensions of social identity of shell ornament producers and consumers would include gender, age, kin relations, and ethnicity (Costin, 1998, 2001, pp. 282–285; Mills, 2000, pp. 313–316, 333). The relationships between producers and consumers, specifically in terms of control over materials, labor, or products, are critical to understanding the organization of shell prestige-goods production.

CONCLUSIONS

Marine shell prestige goods, which so often moved between people and between regions, provide an outstanding focus for the study of relationships between individuals, social groups, and societies. To access this information, archaeologists will need to work at several scales of analysis, from craft locales and household units, to sites or communities, to regions linked through the circulation of raw materials and finished ornaments. Archaeological studies need to examine locations of ornament production and their ultimate deposition. Shell is frequently laden with social meaning, meaning that can be variable and complex. The functions, roles, and symbolic associations of marine shell ornaments may be investigated through the analysis of spatial distributions and archaeological contexts of deposition, through analysis of shell imagery from iconography and texts, and by combining ethnographic, ethnohistoric, and archaeological data for specific societies. The time has come to stop viewing marine shell artifacts as unique. Instead we should look cross-culturally to build a shell technology literature and use this

prime example of prestige goods to contribute to a broader understanding of craft production and exchange systems.

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REFERENCES CITED

Allen, J., Holdaway, S., and Fullagar, R. (1997). Identifying specialisation, production and exchange in the archaeological record: The case of shell bead manufacture on Motupore Island, Papua. *Archaeology in Oceania* **32**: 13–38.

Ames, K. M. (1995). Chiefly power and household production on the Northwest Coast. In Price, T. D., and Feinman, G. M. (eds.), *Foundations of Social Inequality*, Plenum, New York, pp. 155–187.

Andrews, E. W., IV. (1969). *The Archaeological Use and Distribution of Mollusca in the Maya Lowlands*, Middle American Research Institute, Tulane University, New Orleans.

Arnold, J. E. (1987a). *Craft Specialization in the Prehistoric Channel Islands, California*, University of California Press, Berkeley.

Arnold, J. E. (1987b). Technology and economy: Microblade core production from the Channel Islands. In Johnson, J. K., and Morrow, C. A. (eds.), *Organization of Core Technology*, Westview Press, Boulder, CO, pp. 207–237.

Arnold, J. E. (1992). Cultural disruption and the political economy in Channel Islands prehistory. In Jones, T. L. (ed.), *Essays on the Prehistory of Maritime California, Vol. 10*, Center for Archaeological Research at Davis, University of California, Davis, pp. 129–144.

Arnold, J. E., and Graesch, A. P. (2001). The evolution of specialized shellworking among the Island Chumash. In Arnold, J. E. (ed.), *The Origins of a Pacific Coast Chiefdom: The Chumash of the Channel Islands*, University of Utah Press, Salt Lake City, pp. 71–112.

Arnold, J. E., and Munns, A. (1994). Independent or attached specialization: The organization of shell bead production in California. *Journal of Field Archaeology* **21**: 473–489.

Bar-Yosef, D. E. (1991). Changes in the selection of marine shells from the Natufian to the Neolithic. In Bar-Yosef, O., and Valla, F. R. (eds.), *The Natufian Culture in the Levant*, Archaeological Series 1, International Monographs in Prehistory, Ann Arbor, MI, pp. 629–636.

Bayman, J. M. (1992). The circulation of exotics in a Tucson Basin platform mound community. In Lange, R. C., and Germick, S. (eds.), *Proceedings of the Second Salado Conference, Globe, Arizona, 1992*, Arizona Archaeological Society, Phoenix, pp. 31–37.

Bayman, J. M. (1996). Shell ornament consumption in a classic Hohokam platform mound community center. *Journal of Field Archaeology* **23**: 403–420.

Bennyhoff, J. A., and Hughes, R. E. (1987). Shell bead and ornament exchange networks between California and the western Great Basin. *Anthropological Papers of the American Museum of Natural History* **64**: 79–175.

Biscione, R., Durante, S., and Tosi, M. (1981). *Conchiglie: Il commercio e la lavorazione delle conchiglie marine nel Medio Oriente dal IV al II millennio A.C.*, Museo Nazionale d'Arte Orientale, Rome.

Blanton, R. E., Kowalewski, S. A., Feinman, G. M., and Finsten, L. M. (1993). *Ancient Mesoamerica: A Comparison of Change in Three Regions*, Cambridge University Press, Cambridge.

Blitz, J. H. (1993). *Ancient Chiefdoms of the Tombigbee*, University of Alabama Press, Tuscaloosa.

Bradley, R. J. (1993). Marine shell exchange in northwest Mexico and the southwest. In Ericson, J. E., and Baugh, T. G. (eds.), *The American Southwest and Mesoamerica: Systems of Prehistoric Exchange*, Plenum, New York, pp. 121–151.

Bradley, R. J. (2000). Networks of shell ornament exchange: A critical assessment of prestige economies in the North American Southwest. In Hegmon, M. (ed.), *The Archaeology of Regional Interaction: Religion, Warfare, and Exchange across the American Southwest and Beyond*, Proceedings of the 1996 Southwest Symposium, University Press of Colorado, Boulder, pp. 167–187.

Brain, J. P., and Phillips, P. (1996). *Shell Gorgets: Styles of the Late Prehistoric and Protohistoric Southeast*, Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA.

Brown, J. A. (1983). Spiro exchange connections revealed by sources of imported raw materials. In Wyckoff, D. G., and Hofman, J. L. (eds.), *Southeastern Natives and Their Pasts: A Collection of Papers Honoring Dr. Robert E. Bell*, Oklahoma Archeological Survey Studies in Oklahoma's Past No. 11, and Cross Timbers Heritage Association Contribution No. 2, Norman, OK, pp. 129–162.

Brown, J. A. (1989). On style divisions of the Southeastern Ceremonial Complex: A revisionist perspective. In Galloway, P. (ed.), *The Southeastern Ceremonial Complex: Artifacts and Analysis*, University of Nebraska Press, Lincoln, pp. 183–204.

Brown, J. A. (1996). *The Spiro Ceremonial Center: The Archaeology of Arkansas Valley Caddoan Culture in Eastern Oklahoma*, Memoirs No. 29, of the Museum of Anthropology, University of Michigan, Ann Arbor.

Brown, J., and Kelly, J. (2000). Cahokia and the Southeastern Ceremonial Complex. In Ahler, S. R. (ed.), *Mounds, Modoc, and Mesoamerica: Papers in Honor of Melvin L. Fowler*, Scientific Papers Series Vol. XXVIII, Illinois State Museum Springfield, IL, pp. 469–510.

Brown, J. A., Kerber, R. A., and Winters, H. D. (1990). Trade and the evolution of exchange relations at the beginning of the Mississippian period. In Smith, B. D. (ed.), *The Mississippian Emergence*, Smithsonian Institution Press, Washington, DC, pp. 251–280.

Brumfiel, E. M., and Earle, T. K. (1987). Specialization, exchange, and complex societies: An introduction. In Brumfiel, E. M., and Earle, T. K. (eds.), *Specialization, Exchange, and Complex Societies*, Cambridge University Press, Cambridge, pp. 1–9.

Campbell, S. F. (1983). Attaining rank: A classification of kula shell valuables. In Leach, J. W., and Leach, E. (eds.), *The Kula: New Perspectives on Massim Exchange*, Cambridge University Press, Cambridge, pp. 229–248.

Carlson, G. F. (1997). A preliminary survey of marine shell artifacts from prehistoric archeological sites in Nebraska. *Central Plains Archeology* **5**: 11–47.

Ceci, L. (1982). The value of wampum among the New York Iroquois: A case study in artifact analysis. *Journal of Anthropological Research* **38**: 97–107.

Ceci, L. (1989). Tracing wampum's origins: Shell bead evidence from archaeological sites in western and coastal New York. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 63–80.

Claassen, C. (1989). Sourcing marine shell artifacts. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 17–23.

Claassen, C. (1998). *Shells*, Cambridge Manuals in Archaeology, Cambridge University Press, Cambridge.

Claassen, C., and Sigmann, S. (1993). Sourcing *Busycon* artifacts of the eastern United States. *American Antiquity* **58**: 333–347.

Clark, J. E. (1995). Craft specialization as an archaeological category. *Research in Economic Anthropology* **16**: 267–294.

Clark, J. E., and Blake, M. (1994). The power of prestige: Competitive generosity and the emergence of rank societies in lowland Mesoamerica. In Brumfiel, E. M., and Fox, J. W. (eds.), *Factional Competition and Political Development in the New World*, Cambridge University Press, Cambridge, pp. 17–30.

Clark, J. E., and Parry, W. J. (1990). Craft specialization and cultural complexity. In Isaac, B. L. (ed.), *Research in Economic Anthropology*, JAI Press, Greenwich, CT, pp. 289–346.

Cobb, C. R. (1993). Archaeological approaches to the political economy of nonstratified societies. In Schiffer, M. B. (ed.), *Archaeological Method and Theory, Vol. 5*, University of Arizona Press, Tucson, pp. 43–100.

Connell, J. (1977). The Bougainville connection: Changes in the economic context of shell money production in Malaita. *Oceania* **48**: 81–101.

Costin, C. L. (1991). Craft specialization: Issues in defining, documenting, and explaining the organization of production. In Schiffer, M. B. (ed.), *Archaeological Method and Theory*, University of Arizona Press, Tucson, pp. 1–56.

Costin, C. L. (1998). Introduction: Craft and social identity. In Costin, C. L., and Wright, R. P. (eds.), *Craft and Social Identity*, Archeological Papers No. 8, American Anthropological Association Arlington, VA, pp. 3–16.

Costin, C. L. (2001). Craft production systems. In Feinman, G. M., and Price, T. D. (eds.), *Archaeology at the Millennium: A Sourcebook*, Kluwer Academic/Plenum Publishers, New York, pp. 273–327.

Dales, G. F., and Kenoyer, J. M. (1977). Shell working at ancient Balakot, Pakistan. *Expedition* **19**: 13–19.

Dalton, G. (1977). Aboriginal economies in stateless societies. In Earle, T. K., and Ericson, J. E. (eds.), *Exchange Systems in Prehistory*, Academic Press, New York, pp. 191–212.

Dalton, D. M. (1996). The aesthetic of the sublime: An interpretation of Rawa shell valuable symbolism. *American Ethnologist* **23**: 393–415.

D'Altroy, T. N., and Earle, T. K. (1985). Staple finance, wealth finance, and storage in the Inka political economy. *Current Anthropology* **26**: 187–206.

Davis, N. (1989). Conservation of archaeological shell artifacts. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 13–16.

DeMarrais, E., Castillo, L. J., and Earle, T. (1996). Ideology, materialization, and power strategies. *Current Anthropology* **37**: 15–31.

Di Peso, C. C. (1974). *Casas Grandes: A Fallen Trading Center of the Gran Chichimeca*, Amerind Foundation, Dragoon, AZ.

Dixon, J. E., Cann, J. R., and Renfrew, C. (1972). Obsidian and the origins of trade. In Lamberg-Karlovsky, C. C. (ed.), *Old World Archaeology: Foundations of Civilization*, W. H. Freeman, San Francisco, pp. 80–88.

Dreiss, M. L. (1994). Marine and freshwater shell artifacts. In Ricklis, R. A. (ed.), *Aboriginal Life and Culture on the Upper Texas Coast: Archaeology at the Mitchell Ridge Site, 41GV66*, Coastal Archaeological Research, Corpis Christi, TX, pp. 417–445.

Dupré, G., and Rey, P.-P. (1973). Reflections on the pertinence of a theory of the history of exchange. *Economy and Society* **2**: 131–163.

Durante, S. (1979). Marine shells from Balakot, Shahr-i Sokhta and Tepe Yahya: Their significance for trade and technology in ancient Indo-Iran. In Taddei, M. (ed.), *South Asian Archaeology 1977*, Instituto Universitario Orientale, Naples, pp. 317–344.

Eastman, J. M. (2001). Life courses and gender among late prehistoric Siouan communities. In Eastman, J. M., and Rodning, C. B. (eds.), *Archaeological Studies of Gender in the Southeastern United States*, University Press of Florida, Gainesville, pp. 57–76.

Ekholm, K. (1972). *Power and Prestige: The Rise and Fall of the Kongo Kingdom*, Skriv Service AB, Uppsala, Sweden.

Ekholm, K. (1977). External exchange and the transformation of central African social systems. In Friedman, J., and Rowlands, M. J. (eds.), *The Evolution of Social Systems*, Duckworth, London, pp. 115–136.

Erickson, K. (1990). Marine shell utilization in the Plateau culture area. *Northwest Anthropological Research Notes* **24**: 91–144.

Feinman, G. M., and Nicholas, L. M. (1993). Shell-ornament production in Ejutla: Implications for highland-coastal interaction in ancient Oaxaca. *Ancient Mesoamerica* **4**: 103–119.

Feinman, G. M., and Nicholas, L. M. (2000). High-intensity household-scale production in ancient Mesoamerica: A perspective from Ejutla, Oaxaca. In Feinman, G. M., and Manzanilla, L. (eds.), *Cultural Evolution: Contemporary Viewpoints*, Kluwer Academic/Plenum Publishers, New York, pp. 119–142.

Fiedel, S. J. (1989). Social implications of ornaments in hunter–gatherer burials. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 189–197.

Flannery, K. V., and Winter, M. C. (1976). Analyzing household activities. In Flannery, K. V. (ed.), *The Early Mesoamerican Village*, Academic Press, New York, pp. 34–47.

Fowler, M. L., Rose, J., Vander Leest, B., and Ahler, S. R. (1999). *The Mound 72 Area: Dedicated and Sacred Space in Early Cahokia*, Illinois State Museum Reports of Investigations No. 54, Illinois State Museum Society, Springfield.

Francis, P., Jr. (1982). Experiments with early techniques for making whole shells into beads. *Current Anthropology* **23**: 713–714.

Francis, P., Jr. (1989). The manufacture of beads from shell. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 25–35.

Frankenstein, S., and Rowlands, M. J. (1978). The internal structure and regional context of early Iron Age society in south-western Germany. *Bulletin of the Institute of Archaeology, University of London* **15**: 73–112.

Friedman, J., and Rowlands, M. J. (1977). Notes towards an epigenetic model of the evolution of 'civilisation.' In Friedman, J., and Rowlands, M. J. (eds.), *The Evolution of Social Systems*, Duckworth, London, pp. 201–276.

Gallay, G., and Mathieu, G. (1988). Grabbeigaben der Bandkeramik von Ensisheim, Dép. Haut-Rhin (Elsaß). *Germania* **66**: 371–389.

Gifford, E. W. (1926). Clear Lake Pomo society. *University of California Publications in American Archaeology and Ethnology* **18**: 287–390.

Gregory, C. A. (1996). Cowries and conquest: Towards a subalternate quality theory of money. *Comparative Studies in Society and History* **38**: 195–217.

Gregory, H. F. (2002). "Talihata pisa achokma": Silver ornaments, a reflection of early pan-Indianism. Paper presented at the 44th Annual Caddo Conference, Nacogdoches, TX.

Hale, H. S. (1976). *Marine Shells in Midwestern Archaeological Sites and the Determination of Their Most Probable Source*, MA Thesis, Department of Anthropology, Florida Atlantic University, UMI, Ann Arbor.

Halstead, P. (1993). *Spondylus* shell ornaments from late Neolithic Dimini, Greece: Specialized manufacture or unequal accumulation? *Antiquity* **67**: 603–609.

Hamell, G. R. (1996). Wampum: Light, white and bright things are good to think. In Van Dongen, A. (ed.), *'One Man's Trash is Another Man's Treasure': The Metamorphosis of the European Utensil in the New World*, Museum Boymans-van Beuningen, Rotterdam, pp. 41–51.

Hammett, J. E., and Sizemore, B. A. (1989). Shell beads and ornaments: Socioeconomic indicators of the past. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 125–137.

Haselgrove, C. (1982). Wealth, prestige and power: The dynamics of late Iron Age political centralisation in south-east England. In Renfrew, C., and Shennan, S. (eds.), *Ranking, Resource and Exchange: Aspects of the Archaeology of Early European Society*, Cambridge University Press, Cambridge, pp. 79–88.

Hayden, B. (1998). Practical and prestige technologies: The evolution of material systems. *Journal of Archaeological Method and Theory* **5**: 1–55.

Helms, M. W. (1993). *Craft and the Kingly Ideal: Art, Trade, and Power*, University of Texas Press, Austin.

Hill, E. (1998). Death as a rite of passage: The iconography of the Moche burial theme. *Antiquity* **72**: 528–538.

Hirth, K. (1992). Interregional exchange as elite behavior: An evolutionary perspective. In Chase, D. Z., and Chase, A. F. (eds.), *Mesoamerican Elites: An Archaeological Assessment*, University of Oklahoma Press, Norman, pp. 18–29.

Hogendorn, J., and Johnson, M. (1986). *The Shell Money of the Slave Trade*, Cambridge University Press, Cambridge.

Holley, G. R. (1995). Microliths and the Kunnemann Tract: An assessment of craft production at the Cahokia site. *Illinois Archaeology* **7**: 1–68.

Holmes, W. H. (1883). Art in shell of the ancient Americans. In *Second Annual Report of the Bureau of American Ethnology, 1880–1881*, Smithsonian Institution, Government Printing Office, Washington, DC, pp. 179–305.

Howard, A. V. (1985). A reconstruction of Hohokam interregional shell production and exchange within southwestern Arizona. In Dittert, A. E., Jr., and Dove, D. E. (eds.), *Proceedings of the 1983 Hohokam Symposium, Part II*, Occasional Paper No. 2, Phoenix Chapter, Arizona Archaeological Society, Phoenix, pp. 459–472.

Hughes, R. E. (1994). Mosaic patterning in prehistoric California–Great Basin exchange. In Baugh, T. G., and Ericson, J. E. (eds.), *Prehistoric Exchange Systems in North America*, Plenum, New York, pp. 363–383.

Kelly, J. E. (1991) Cahokia and its role as a gateway center in interregional exchange. In Emerson, T. E., and Lewis, R. B. (eds.) *Cahokia and the Hinterlands: Middle Mississippian Cultures of the Midwest*, University of Illinois Press, Urbana, pp. 61–80.

Kelly, J. E. (1995). *From the Ditch: The Anatomy of a Moorehead Phase House Complex along Kingshighway, St. Clair County, Illinois*, Office of Contract Archaeology, Southern Illinois University, Edwardsville.

Kenoyer, J. M. (1985). Shell working at Moenjo-daro, Pakistan. In Schotsman, J. and Taddei, M. (eds.), *South Asian Archaeology 1983, Papers From the 7th International Conference of the Association of South Asian Archaeologists in Western Europe*, Dipartimento di Studi Asiatici, Series Minor XXIII, Istituto Universitario Orientale, Naples, pp. 297–344.

Kenoyer, J. M. (1997). Trade and technology of the Indus Valley: New insights from Harappa, Pakistan. *World Archaeology* **29**: 262–280.

King, C. (1976). Chumash inter-village economic exchange. In Bean, L. J., and Blackburn, T. C. (eds.), *Native Californians: A Theoretical Retrospective*, Ballena Press, Socorro, NM, pp. 289–318.

King, C. (1978). Protohistoric and historic archeology. In Heizer, R. F. (ed.), *Handbook of North American Indians*, Smithsonian Institution Press, Washington, DC, pp. 58–68.

Kneberg, M. (1959). Engraved shell gorgets and their associations. *Tennessee Archaeologist* **15**: 1–39.

Laporte, L. (1998). Ornament production centers along the French Atlantic Coast during the late Neolithic. In Milliken, S., and Vidale, M. (eds.), *Papers From the EAA Third Annual Meeting at Ravenna 1997*, BAR International Series, Archaeopress, Oxford, pp. 17–23.

Leach, J. W. (1983). Introduction. In Leach, J. W., and Leach, E. (eds.), *The Kula: New Perspectives on Massim Exchange*, Cambridge University Press, Cambridge, pp. 1–26.

Leach, J. W., and Leach, E. (eds.) (1983). *The Kula: New Perspectives on Massim Exchange*, Cambridge University Press, Cambridge.

Lewenstein, S. M. (1987). *Stone Tool Use at Cerros: The Ethnoarchaeological and Use- Wear Evidence*, University of Texas Press, Austin.

Lewis, A. B. (1929). *Melanesian Shell Money in Field Museum Collections*, Field Museum of Natural History, Anthropological Series XIX (1), Chicago.

Loeb, E. M. (1926). Pomo folkways. *University of California Publications in American Archaeology and Ethnology* **19**: 149–405.

Luer, G., Allerton, D., Hazeltine, D., Hatfield, R., and Hood, D. (1986). Whelk shell tool blanks from Big Mound Key (8CH10), Charlotte County, Florida: With notes on certain whelk shell tools. *The Florida Anthropologist* **39**: 92–124.

Malinowski, B. (1922). *Argonauts of the Western Pacific*, Routledge and Kegan Paul, London.

Mason, R. J., and Perino, G. (1961). Microblades at Cahokia, Illinois. *American Antiquity* **26**: 553–557.

Masucci, M. (1995). Marine shell bead production and the role of domestic craft activities in the economy of the Guangala phase southwest Ecuador. *Latin American Antiquity* **6**: 70–84.

McGuire, R. H. (1985). The role of shell exchange in the explanation of Hohokam prehistory. In Dittert, A. E., Jr., and Dove, D. E. (eds.), *Proceedings of the 1983 Hohokam Symposium, Part II*, Occasional Paper No. 2, Phoenix Chapter, Arizona Archaeological Society, Phoenix, pp. 473–482.

McGuire, R. H. (1989). The greater southwest as a periphery of Mesoamerica. In Champion, T. C. (ed.), *Centre and Periphery: Comparative Studies in Archaeology*, Unwin Hyman, London, pp. 40–66.

McGuire, R. H., and Howard, A. V. (1987). The structure and organization of Hohokam shell exchange. *The Kiva* **52**: 113–146.

McVicker, D., and Palka, J. W. (2001). A Maya carved shell plaque from Tula, Hidalgo, Mexico. *Ancient Mesoamerica* **12**: 175–197.

Meillassoux, C. (1978). "The economy" in agricultural self-sustaining societies: A preliminary analysis. In Seddon, D. (ed.), *Relations of Production: Marxist Approaches to Economic Anthropology*, Frank Cass, London, pp. 127–157.

Mester, A. M. (1989). Marine shell symbolism in Andean culture. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 157–167.

Michaelides, D. (1995). Cyprus and the Persian Gulf in the Hellenistic and Roman periods: The case of *Pinctada margaritifera*. *Proceedings of the International Symposium, Cyprus and the Sea, Nicosia, 25–26 September, 1993*, University of Cyprus, Nicosia, pp. 211–226.

Miller, M. A. (1996). The manufacture of cockle shell beads at early Neolithic Franchthi Cave, Greece: A case of craft specialization? *Journal of Mediterranean Archaeology* **9**: 7–37.

Mills, B. J. (2000). Gender, craft production, and inequality. In Crown, P. L. (ed.), *Women and Men in the Prehispanic Southwest: Labor, Power, and Prestige*, School of American Research Press, Santa Fe, NM, pp. 301–343.

Milner, G. R. (1998). *The Cahokia Chiefdom: The Archaeology of a Mississippian Society*, Smithsonian Institution Press, Washington, DC.

Moholy-Nagy, H. (1989). Formed shell beads from Tikal, Guatemala. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center Rochester, NY, pp. 139–156.

Moholy-Nagy, H. (1995). Shells and society at Tikal, Guatemala. *Expedition* **37**: 3–13.

Morse, D. (1975). *Report of Excavations at the Zebree Site, 1969*, Research Report No. 4, Arkansas Archeological Survey, Fayetteville.

Morse, D. F., and Morse, P. A. (1983). *Archaeology of the Central Mississippi Valley*, Academic Press, New York.

Muller, J. (1986). Pans and a grain of salt: Mississippian specialization revisited. *American Antiquity* **51**: 405–409.

Muller, J. (1987). Salt, chert, and shell: Mississippian exchange and economy. In Brumfiel, E. M., and Earle, T. K. (eds.), *Specialization, Exchange, and Complex Societies*, Cambridge University Press, Cambridge, pp. 10–21.

Muller, J. (1989). The Southern Cult. In Galloway, P. (ed.), *The Southeastern Ceremonial Complex: Artifacts and Analysis*, University of Nebraska Press, Lincoln, pp. 11–26.

Muller, J. (1997). *Mississippian Political Economy*, Plenum, New York.

Ottesen, A. I. (1979). *A Preliminary Study of Acquisition of Exotic Raw Materials by Late Woodland and Mississippian Groups*, PhD Dissertation, Department of Anthropology, New York University, UMI, Ann Arbor.

Pauketat, T. R. (1993). *Temples for Cahokia Lords: Preston Holder's 1955–1956 Excavations of Kunnemann Mound*, Memoirs No. 26, Museum of Anthropology, University of Michigan, Ann Arbor.

Pauketat, T. R. (1997). Specialization, political symbols, and the crafty elite of Cahokia. *Southeastern Archaeology* **16**: 1–15.

Paulsen, A. C. (1974). The thorny oyster and the voice of God: *Spondylus* and *Strombus* in Andean prehistory. *American Antiquity* **39**: 597–607.

Pearce, L. E. (1993). To whom do they belong?: Cowrie shells in historical archaeology. *African-American Archaeology* **9**: 1–3.

Pearson, R. (1990). Chiefly exchange between Kyushu and Okinawa, Japan, in the Yayoi period. *Antiquity* **84**: 912–922.

Peregrine, P. (1990). *The Evolution of Mississippian Societies in the American Midcontinent From a World-System Perspective*, PhD Dissertation, Department of Anthropology, Purdue University, UMI, Ann Arbor.

Peregrine, P. (1991). Some political aspects of craft specialization. *World Archaeology* **23**: 1–11.

Peterson, R. R., Jr. (1986). Analysis of shell working traces on experimental and archaeological bladelet drills. *Wyoming Archaeologist* **29**: 97–107.

Phillips, P., and Brown, J. A. (1978). *Pre-Columbian Shell Engravings From the Craig Mound at Spiro, Oklahoma*, Part 1, paperback edn., Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Phillips, P., and Brown, J. A. (1984). *Pre-Columbian Shell Engravings From the Craig Mound at Spiro, Oklahoma*, Part 2, paperback edn., Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Pietak, L. M. (1998). Body symbolism and cultural aesthetics: The use of shell beads and ornaments by Delaware and Munsee groups. *North American Archaeologist* **19**: 135–161.

Pires-Ferreira, J. W. (1976). Shell and iron-ore mirror exchange in formative Mesoamerica, with comments on other commodities. In Flannery, K. V. (ed.), *The Early Mesoamerican Village*, Academic Press, New York, pp. 311–328.

Pope, M. K. (1989). Microtools from the Black Warrior Valley: Technology, use, and context. Unpublished MA Thesis, Department of Anthropology, State University of New York, Binghamton.

Prentice, G. (1983). Cottage industries: Concepts and implications. *Midcontinental Journal of Archaeology* **8**: 17–48.

Prentice, G. (1987). Marine shells as wealth items in Mississippian societies. *Midcontinental Journal of Archaeology* **12**: 193–223.

Reese, D. S. (1980). Industrial exploitation of Murex shells: Purple-dye and lime production at Sidi Khrebish, Benghazi (Berenice). *Libyan Studies* **11**: 79–93.

Reese, D. S. (1985). Appendix VIIIA: The Late Bronze Age to Geometric shells from Kition. In Karageorghis, V. *Excavations at Kition V, Part II*, Department of Antiquities, Nicosia, pp. 340–371.

Reese, D. S. (1986). The marine and freshwater shells. In McGovern, P. E. (ed.), *The Late Bronze and Early Iron Ages of Central Transjordan: The Baq'ah Valley Project, 1977–1981*, University Museum, University of Pennsylvania, Philadelphia, pp. 320–332.

Reese, D. S. (1987). Palaikastro shells and Bronze Age purple-dye production in the Mediterranean Basin. *The Annual of the British School of Archaeology at Athens* **82**: 201–206.

Reese, D. S. (1988). A new engraved Tridacna shell from Kish. *Journal of Near Eastern Studies* **47**: 35–41.

Reese, D. S. (1989). Treasures from the sea: Shells and shell ornaments from Hasanlu IVB. *Expedition* **31**: 80–86.

Reese, D. S. (1990). Marine and worked shells. In Algaze, G. (ed.), *Town and Country in Southeastern Anatolia, II, The Stratigraphic Sequence at Kurban Höyük*, Oriental Institute Publications 110, University of Chicago, Chicago, pp. 410–416.

Reese, D. S. (1991a). Marine shells in the Levant: Upper Paleolithic, Epipaleolithic and Neolithic. In Bar-Yosef, O., and Valla, F. R. (eds.), *The Natufian Culture in the Levant*, Archaeological Series 1, International Monographs in Prehistory, Ann Arbor, MI, pp. 613–628.

Reese, D. S. (1991b). The trade of Indo-Pacific shells into the Mediterranean Basin and Europe. *Oxford Journal of Archaeology* **10**: 159–196.

Reese, D. S., and Sease, C. (1993). Some previously unpublished engraved Tridacna shells. *Journal of Near Eastern Studies* **52**: 109–128.

Renfrew, C. (1975). Trade as action at a distance: Questions of integration and communication. In Sabloff, J. A., and Lamberg-Karlovsky, C. C. (eds.), *Ancient Civilization and Trade*, University of New Mexico Press, Albuquerque, pp. 3–59.

Renfrew, C., and Bahn, P. (1996). *Archaeology: Theories, Methods, and Practice*, Thames and Hudson, London.

Ross, K. (1981). Shell ornaments of Malaita: Currency and ritual valuables in the central Solomons. *Expedition* **23**: 20–26.

Saitta, D. J. (1999). Prestige, agency, and change in middle-range societies. In Robb, J. E. (ed.), *Material Symbols: Culture and Economy in Prehistory*. Occasional Paper No. 26, Center for Archaeological Investigations, Southern Illinois University, Carbondale, pp. 135–149.

Sandweiss, D. H. (1999). The return of the native symbol: Peru picks *Spondylus* to represent new integration with Ecuador. *Society for American Archaeology Bulletin* **17**: 1, 8–9.

Saunders, N. J. (1999). Biographies of brilliance: Pearls, transformations of matter and being, c. A.D. 1492. *World Archaeology* **31**: 243–257.

Schambach, F. F. (1993). Some new interpretations of Spiroan culture history. In Stoltman, J. B. (ed.), *Archaeology of Eastern North America: Papers in Honor of Stephen Williams*, Archaeological Report No. 25, Mississippi Department of Archives and History, Jackson, pp. 187–230.

Schambach, F. F. (1999). Spiro and the Tunica: A new interpretation of the role of the Tunica in the culture history of the Southeast and the southern Plains, A.D. 1100–1750. In Mainfort, R. C., Jr., and Jeter, M. D. (eds.), *Arkansas Archaeology: Essays in Honor of Dan and Phyllis Morse*, University of Arkansas Press, Fayetteville, pp. 169–224.

Schnell, F. T., Knight, V. J., Jr., and Schnell, G. S. (1981). *Cemochechobee: Archaeology of a Mississippian Ceremonial Center on the Chattahoochee River*, Ripley P. Bullen Monographs in Anthropology and History No. 3, University of Florida/Florida State Museum, University Presses of Florida, Gainesville.

Sciama, L. D., and Eicher, J. B. (eds.) (1998). *Beads and Bead Makers: Gender, Material Culture and Meaning*, Berg, Oxford.

Sempowski, M. L. (1989). Fluctuations through time in the use of marine shell at Seneca Iroquois sites. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 81–96.

Seymour, D. J. (1988). An alternative view of Sedentary period Hohokam shell-ornament production. *American Antiquity* **53**: 812–829.

Seymour, D. J., and Schiffer, M. B. (1987). A preliminary analysis of pithouse assemblages from Snaketown, Arizona. In Kent, S. (ed.), *Method and Theory for Activity Area Research: An Ethnoarchaeological Approach*, Columbia University Press, New York, pp. 549–603.

Shackleton, J., and Elderfield, H. (1990). Strontium isotope dating of the source of Neolithic European *Spondylus* shell artefacts. *Antiquity* **64**: 312–315.

Shackleton, N., and Renfrew, C. (1970). Neolithic trade routes re-aligned by oxygen isotope analyses. *Nature* **228**: 1062–1065.

Sierzchula, M. C. (1980). Replication and use studies of the Zebree microlith industry. Unpublished MA Thesis, Department of Anthropology, University of Arkansas, Fayetteville.

Slotkin, J. S., and Schmitt, K. (1949). Studies of Wampum. *American Anthropologist* **51**: 223–236.

Smith, T. J. (1983). Wampum as primitive valuables. In Dalton, G. (ed.), *Research in Economic Anthropology*, JAI Press, Greenwich, CT, pp. 225–246.

Smith, M. T., and Smith, J. B. (1989). Engraved shell masks in North America. *Southeastern Archaeology* **8**: 9–18.

Strathern, A. (1975). *The Rope of Moka: Big-Men and Ceremonial Exchange in Mount Hagen, New Guinea*, Cambridge University Press, Cambridge.

Thomas, L. A. (1996). A study of shell beads and their social context in the Mississippian Period: A case from the Carolina Piedmont and Mountains. *Southeastern Archaeology* **15**: 29–46.

Topping, J. M. (1989). An introduction to molluscs and their identification. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 7–11.

Tosi, M. (1984). The notion of craft specialization and its representation in the archaeological record of early states in the Turanian Basin. In Spriggs, M. (ed.), *Marxist Perspectives in Archaeology*, Cambridge University Press, Cambridge, pp. 22–52.

Trubitt, M. B. D. (1996). *Household Status, Marine Shell Bead Production, and the Development of Cahokia in the Mississippian Period*, PhD Dissertation, Department of Anthropology, Northwestern University, UMI, Ann Arbor.

Trubitt, M. B. D. (1997). Household status and craft working at Cahokia. Paper presented at the 62nd Annual Meeting of the Society for American Archaeology, Nashville, TN.

Trubitt, M. B. D. (2000). Mound building and prestige goods exchange: Changing strategies in the Cahokia chiefdom. *American Antiquity* **65**: 669–690.

Turner, M. H. (1993). Style in lapidary technology: Identifying the Teotihuacan lapidary industry. In Berlo, J. C. (ed.), *Art, Ideology, and the City of Teotihuacan*, Dumbarton Oaks Research Library and Collection, Washington, DC, pp. 89–112.

Webb, W. S. (1974). *Indian Knoll*, University of Tennessee Press, Knoxville.

Weiner, A. B. (1976). *Women of Value, Men of Renown: New Perspectives in Trobriand Exchange*, University of Texas Press, Austin.

Weiner, A. B. (1988). *The Trobrianders of Papua New Guinea*, Harcourt Brace Jovanovich, Fort Worth.
Welch, P. D. (1991). *Moundville's Economy*, University of Alabama Press, Tuscaloosa.
Winters, H. D. (1968). Value systems and trade cycles of the late Archaic in the Midwest. In Binford, S. R., and Binford, L. R. (eds.), *New Perspectives in Archaeology*, Aldine, Chicago, pp. 175–222.
Wright, R. P. (1996). Contexts of specialization: V. Gordon Childe and social evolution. In Wailes, B. (ed.), *Craft Specialization and Social Evolution: In Memory of V. Gordon Childe*, Monograph 93, University Museum of Archaeology and Anthropology, University of Pennsylvania, Philadelphia, pp. 123–132.
Yerkes, R. W. (1983). Microwear, microdrills, and Mississippian craft specialization. *American Antiquity* **48**: 499–518.
Yerkes, R. W. (1986). Licks, pans, and chiefs: A comment on "Mississippian specialization and salt." *American Antiquity* **51**: 402–404.
Yerkes, R. W. (1987). *Prehistoric Life on the Mississippi Floodplain*, University of Chicago Press, Chicago.
Yerkes, R. W. (1989a). Mississippian craft specialization on the American Bottom. *Southeastern Archaeology* **8**: 93–106.
Yerkes, R. W. (1989b). Shell bead production and exchange in prehistoric Mississippian populations. In Hayes, I. C. F., Ceci, L., and Bodner, C. C. (eds.), *Proceedings of the 1986 Shell Bead Conference: Selected Papers*, Research Records No. 20, Rochester Museum and Science Center, Rochester, NY, pp. 113–123.
Yerkes, R. W. (1991). Specialization in shell artifact production at Cahokia. In Stoltman, J. B. (ed.), *New Perspectives on Cahokia: Views From the Periphery*, Monographs in World Archaeology No. 2, Prehistory Press, Madison, WI, pp. 49–64.
Ziderman, I. I. (1990). Seashells and ancient purple dyeing. *Biblical Archaeologist* **53**: 98–101.

BIBLIOGRAPHY OF RECENT LITERATURE

Arnold, J. E., Preziosi, A. M., and Shattuck, P. (2001). Flaked stone craft production and exchange in island Chumash territory. In Arnold, J. E. (ed.), *The Origins of a Pacific Coast Chiefdom: The Chumash of the Channel Islands*, University of Utah Press, Salt Lake City, pp. 113–131.
Bar-Yosef Mayer, D. E. (1997). Neolithic shell bead production in Sinai. *Journal of Archaeological Science* **24**: 97–111.
Bayman, J. M. (2002). Hohokam craft economies and the materialization of power. *Journal of Archaeological Method and Theory* **9**: 69–95.
Blakeslee, D. J. (1997). The marine shell artifacts of Kansas. *Central Plains Archeology* **5**: 3–9.
Blower, D. (1996). *The Quest for Mullu: Concepts, Trade, and the Archaeological Distribution, of Spondylus in the Andes (Ecuador, Peru)*, MA Thesis, Department of Anthropology, Trent University, UMI, Ann Arbor.
Bradley, R. J. (1995). A comparison of shell ornament production strategies in the North American southwest. Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis, MN.
Bradley, R. J. E. (1996). *The Role of Casas Grandes in Prehistoric Shell Exchange Networks Within the Southwest*, PhD Dissertation, Department of Anthropology, Arizona State University, UMI, Ann Arbor.
Bradley, R. J. (1999). Shell exchange within the Southwest: The Casas Grandes interaction sphere. In Schaafsma, C. F., and Riley, C. L. (eds.), *The Casas Grandes World*, University of Utah Press, Salt Lake City, pp. 213–228.
Carter, B. P. (1999). Beads of change: An experimental approach to shell bead production on the Santa Elena peninsula, Ecuador. Paper presented at the 64th Annual Meeting of the Society for American Archaeology, Chicago.
Descantes, C. (1998). *Integrating Archaeology and Ethnohistory: The Development of Exchange between Yap and Ulithi, Western Caroline Islands (Micronesia)*, PhD Dissertation, Department of Anthropology, University of Oregon, UMI, Ann Arbor.

Dreiss, M. L. (1995). The occurrence of marine shell ornaments at the Mitchell Ridge site on Galveston Island, Texas. Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis, MN.

Earle, T. (1994). Wealth finance in the Inka Empire: Evidence from the Calchaqui Valley, Argentina. *American Antiquity* **59**: 443–460.

Feinman, G. M., and Nicholas, L. M. (1995). Household craft specialization and shell ornament manufacture in Ejutla, Mexico. *Expedition* **37**: 14–25.

Fosha, M. (1997). Faces of shell: Two marine shell mask gorgets from South Dakota. *Central Plains Archeology* **5**: 69–75.

Galm, J. R. (1994). Prehistoric trade and exchange in the Interior Plateau of northwestern North America. In Baugh, T. G., and Ericson, J. E. (eds.), *Prehistoric Exchange Systems in North America*, Plenum, New York, pp. 275–305.

Gassón, R. A. (2000). Quirípas and mostacillas: The evolution of shell beads as a medium of exchange in northern South America. *Ethnohistory* **47**: 581–609.

Harris, R. N. (1999). *Craft Specialization in a 19th Century African-American Community: The Shell Carver's Cabin on the Levi Jordan Plantation, Brazoria County, Texas*, MA Thesis, Department of Anthropology, University of Houston, UMI, Ann Arbor.

Hohlfelder, R. L., and Vann, R. L. (1998). Uncovering the maritime secrets of Aperlae, a coastal settlement of ancient Lycia. *Near Eastern Archaeology* **61**: 26–37.

Hohmann, B. M. (2002). *Preclassic Maya Shell Ornament Production in the Belize Valley, Belize*, PhD Dissertation, Department of Anthropology, University of New Mexico, UMI, Ann Arbor.

Jaynes, S. (1997). Marine shell mask gorgets in Montana. *Central Plains Archeology* **5**: 99–103.

Koeppe, W. (1997). Chinese shells, French prints, and Russian goldsmithing: A curious group of eighteenth-century Russian table snuffboxes. *Metropolitan Museum Journal* **32**: 207–214.

Kozuch, L. (1998). *Marine Shells from Mississippian Archaeological Sites (Illinois, Oklahoma, Georgia, Alabama)*, PhD Dissertation, Department of Anthropology, University of Florida, UMI, Ann Arbor.

Kozuch, L. (2002). *Olivella* beads from Spiro and the Plains. *American Antiquity* **67**: 697–709.

Kuhn, S. L., Stiner, M. C., Reese, D. S., and Gulec, E. (2001). Ornaments of the earliest Upper Paleolithic: New insights from the Levant. *Proceedings of the National Academy of Sciences* **98**: 7641–7646.

Lippincott, K. (1997). Mussels, mussel shell tools, and mussel and marine shell ornaments from Missouri River Trench sites in South Dakota. *Central Plains Archeology* **5**: 49–67.

Marquardt, W. H. (1992). Shell artifacts from the Caloosahatchee area. In Marquardt, W. H., and Payne, C. (eds.), *Culture and Environment in the Domain of the Calusa*, Institute of Archaeology and Paleoenvironmental Studies Monograph 1, University of Florida, Gainesville, pp. 191–221.

McGuire, R. H. (1993). The structure and organization of Hohokam exchange. In Ericson, J. E. and Baugh, T. G. (eds.), *The American Southwest and Mesoamerica: Systems of Prehistoric Exchange* Plenum, New York, pp. 95–119.

Middleton, W. D. (1998). *Craft Specialization at Ejutla, Oaxaca, Mexico: An Archaeometric Study of the Organization of Household Craft Production*, PhD Dissertation, Department of Anthropology, University of Wisconsin-Madison, UMI, Ann Arbor.

Miller, M. A. (1997). *Jewels of Shell and Stone, Clay and Bone: The Production, Function, and Distribution of Aegean Stone Age Ornaments*, PhD Dissertation, Department of Archaeology, Boston University, UMI, Ann Arbor.

Mitchell, P. J. (1996). Prehistoric exchange and interaction in southeastern Southern Africa: Marine shells and ostrich eggshell. *African Archaeological Review* **13**: 35–76.

Moholy-Nagy, H. (1995). Contexts of shell artifact production and consumption at Tikal, Guatemala. Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis, MN.

Moholy-Nagy, H. (1997). Middens, construction fill, and offerings: Evidence for the organization of Classic Period craft production at Tikal, Guatemala. *Journal of Field Archaeology* **24**: 293–313.

Morse, K. (1993). Shell beads from Mandu Mandu Creek Rock-shelter, Cape Range Peninsula, Western Australia, dated before 30,000 b.p. *Antiquity* **67**: 877–883.

Muller, J. (1995). Regional interaction in the later Southeast. In Nassaney, M. S., and Sassaman, K. E. (eds.), *Native American Interactions: Multiscalar Analyses and Interpretations in the Eastern Woodlands*, University of Tennessee Press, Knoxville, pp. 317–340.

Picha, P. R., and Swenson, F. E. (1997). Whorls and valves: Marine shell artifacts from North Dakota. *Central Plains Archeology* **5**: 77–97.

Reese, D. S. (1992a). Appendix I, Recent and fossil invertebrates. In McDonald, W. A., and Wilkie, N. C. (eds.), *Excavations at Nichoria in Southwest Greece, II, The Bronze Age Occupation*, University of Minnesota Press, Minneapolis, pp. 770–778.

Reese, D. S. (1992b). Shells and animal bones. In Karageorghis, V., Picard, O., and Tytgat, C. (eds.), *La Necropole D'Amathonte, Tombes 113–367, VI, Bijoux, Armes, Verre, Astragales et Coquillages, Squelettes*, Etudes Chypriotes XIV, Service des Antiquites de Chypre, Ecole Francaise d'Athenes, Fondation A. G. Leventis, Nicosie, pp. 123–141.

Reese, D. S. (1992c). Shells from the 1986 season. In MacDonald, B. (ed.), *The Southern Ghors and Northeast 'Arabah Archaeological Survey*, Sheffield Archaeological Monographs 5, Department of Archaeology and Prehistory, University of Sheffield, Sheffield, pp. 155–156.

Reese, D. S. (1995a). Marine invertebrates and fossils. In Bennett, C.-M., and Bienkowski, P. (eds.), *Excavations at Tawilan in Southern Jordan*, British Academy Monographs in Archaeology No. 8, The British Institute at Amman for Archaeology and History. Oxford University Press, Oxford, pp. 93–96, 345.

Reese, D. S. (1995b). Marine invertebrates and other shells from Jerusalem (Sites A, C and L). In Eshel, I., and Prag, K. (eds.), *Excavations by K. M. Kenyon in Jerusalem 1961–1967, IV*, British Academy Monographs in Archaeology No. 6, British School of Archaeology in Jerusalem, Oxford University Press, Oxford, pp. 265–278.

Reese, D. S. (1995c). Shells from the Wadi Hisma sites. In Henry, D. O. (ed.), *Prehistoric Cultural Ecology and Evolution: Insights from Southern Jordan*, Plenum, New York, pp. 385–390.

Reese, D. S. (1995d). The shells from Upper Zohar. In Harper, R. P. (ed.), *Upper Zohar—An Early Byzantine Fort in Palestina Tertia, Final Report of Excavations in 1985–1986*, British Academy Monographs in Archaeology No. 9, British School of Archaeology in Jerusalem, Oxford University Press, Oxford, pp. 97–98.

Reese, D. S. (1996). Appendix 8: Animal bones and shells. In Coleman, J. E., Barlow, J. A., Mogelonsky, M. K., and Schaar, K. W. (eds.), *Alambra, A Middle Bronze Age Settlement in Cyprus: Archaeological Investigations by Cornell University, 1974–1985*, Studies in Mediterranean Archaeology Vol. CXVIII, Paul Astroms Forlag, Jonsered, pp. 475–514.

Reese, D. S. (1998). Beads: Marine shells. In Betts, A. V. G. (ed.), *The Harra and the Hamad: Excavations and Surveys in Eastern Jordan 1*, Sheffield Archaeological Monographs 9, Sheffield Academic Press, Sheffield, pp. 138.

Reese, D. (1999). Marine invertebrates. In Simmons, A. H. (ed.), *Faunal Extinction in an Island Society: Pygmy Hippopotamus Hunters of Cyprus*, Kluwer Academic/Plenum Publishers, New York, pp. 188–191.

Smith, M. T. (1997). Shell from the Plains: A southeastern perspective. *Central Plains Archeology* **5**: 105–107.

Snyder, G. S. (1999). Wampum: A material symbol of cultural value to the Iroquois peoples of northeastern North America. In Robb, J. E. (ed.), *Material Symbols: Culture and Economy in Prehistory*, Occasional Paper No. 26, Center for Archaeological Investigations, Southern Illinois University, Carbondale, pp. 362–381.

Stieglitz, R. R. (1994). The Minoan origin of Tyrian purple. *Biblical Archaeologist* **57**: 46–54.

Stiner, M. C. (1999). Paleolithic mollusc exploitation at Riparo Mochi (Balzi Rossi, Italy): Food and ornaments from the Aurignacian through Epigravettian. *Antiquity* **73**: 735–754.

Tooker, E. (1998). A note on the return of eleven wampum belts to the Six Nations Iroquois Confederacy on Grand River, Canada. *Ethnohistory* **45**: 219–236.

Trubitt, M. B. D. (1995). Marine shell ornament production at Cahokia. Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis, MN.

Vargas Arenas, I., Toledo, M. I., Molina, L. E., and Montcourt, C. E. (1993). *Los Artifices de la Concha*, Contribuciones a la Arqueología Tropical No. 1, USDA Forest Service Southern Region, Organización de los Estados Americanos.

Vellanoweth, R. L. (2001). AMS radiocarbon dating and shell bead chronologies: Middle Holocene trade and interaction in western North America. *Journal of Archaeological Science* **28**: 941–950.

Yerkes, R. W. (1992). Microwear analysis of microdrills. In Esarey, D., and Pauketat, T. R. (eds.), *The Lohmann Site: An Early Mississippian Center in the American Bottom*, University of Illinois Press, Urbana, pp. 133–138.

Yerkes, R. W. (1993). Methods of manufacturing shell beads at prehistoric Mississippian sites in southeastern North America. In Beyries, S. (ed.), *Traceologie et Fonction: Le Gest Retrouve*, Centre de Recherches Archeologiques du CNRS, Etudes et Recherches Archeologiques de l'Universite de Liege, Liege, Belgium, pp. 235–242.